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A COMPARISON OF THE DEVELOPMENTAL DRAWING CHARACTERISTICS OF CULTURALLY ADVANTAGED AND CULTURALLY DISADVANTAGED CHILDREN. FINAL REPORT.

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THE DEVELOPMENTAL STAGES IN THE ART OF CHILDREN HAVE BEEN THE SUBJECT OF MUCH CHILD DEVELOPMENT THEORY AND RESEARCH. MUCH OF THIS WORK, EXAMPLES OF WHICH ARE PRESENTED IN THE INTRODUCTORY PORTION OF THIS DOCUMENT, HAS BEEN MERELY ANECDOTAL. OF CONCERN IN THIS STUDY ARE (1) THE FORMULATION OF OBJECTIVE PROCEDURES TO ASSESS THE DEVELOPMENTAL DRAWING CHARACTERISTICS FOUND IN CHILDREN'S ART, (2) A COMPARISON OF THE DRAWINGS OF ADVANTAGED AND DISADVANTAGED CHILDREN, AND (3) A DETERMINATION OF THE RELATIONSHIP BETWEEN PERCEPTION AS MANIFESTED IN DRAWING AND LANGUAGE AS ASSESSED BY A TEST OF READING VOCABULARY. THE SUBJECTS OF THIS STUDY WERE 1093 FIRST, THIRD, FIFTH, AND SEVENTH GRADE CHILDREN OF NEGRO OR WHITE RACES AND MIDDLE OR LOW INCOME LEVELS. THESE CHILDREN WERE INSTRUCTED DURING A CLASS PERIOD TO DRAW A PLAYGROUND SCENE. A DAY LATER, THE FIFTH AND SEVENTH GRADE PUPILS WERE ADMINISTERED THE GATES READING TEST. ON THE BASIS OF THE PLAYGROUND DRAWINGS, A 14-CATEGORY SCALE OF DRAWING DEVELOPMENTAL LEVEL WAS CONSTRUCTED, THE CRITERION BEING PERCEPTION OF SPACIAL RELATIONSHIPS. THE MORE SOPHISTICATED THE CHILD'S PRESENTATION OF SPACIAL RELATIONSHIPS, THE HIGHER HIS DEVELOPMENT. THE SCALE WAS VALIDATED BY HAVING 2 JUDGES INDEPENDENTLY CLASSIFY EXTRA PLAYGROUND DRAWINGS ACCORDING TO THE 14 CATEGORIES COMPOSING THE SCALE. THE CORRELATION WAS ABOUT .72. THE RESULTS OF CATEGORIZING THE EXPERIMENTAL DRAWINGS SHOWED THAT ADVANTAGED CHILDREN HAD A HIGHER DEVELOPMENT THAN THE DISADVANTAGED CHILDREN IN ALL 4 GRADES, ALTHOUGH THE GAP APPEARED TO DIMINISH FROM GRADE 1 TO GRADE 7. THERE ALSO APPEARED TO BE A SIGNIFICANT POSITIVE CORRELATION BETWEEN DRAWING SCORES AND READING VOCABULARY SCORES. (WD)

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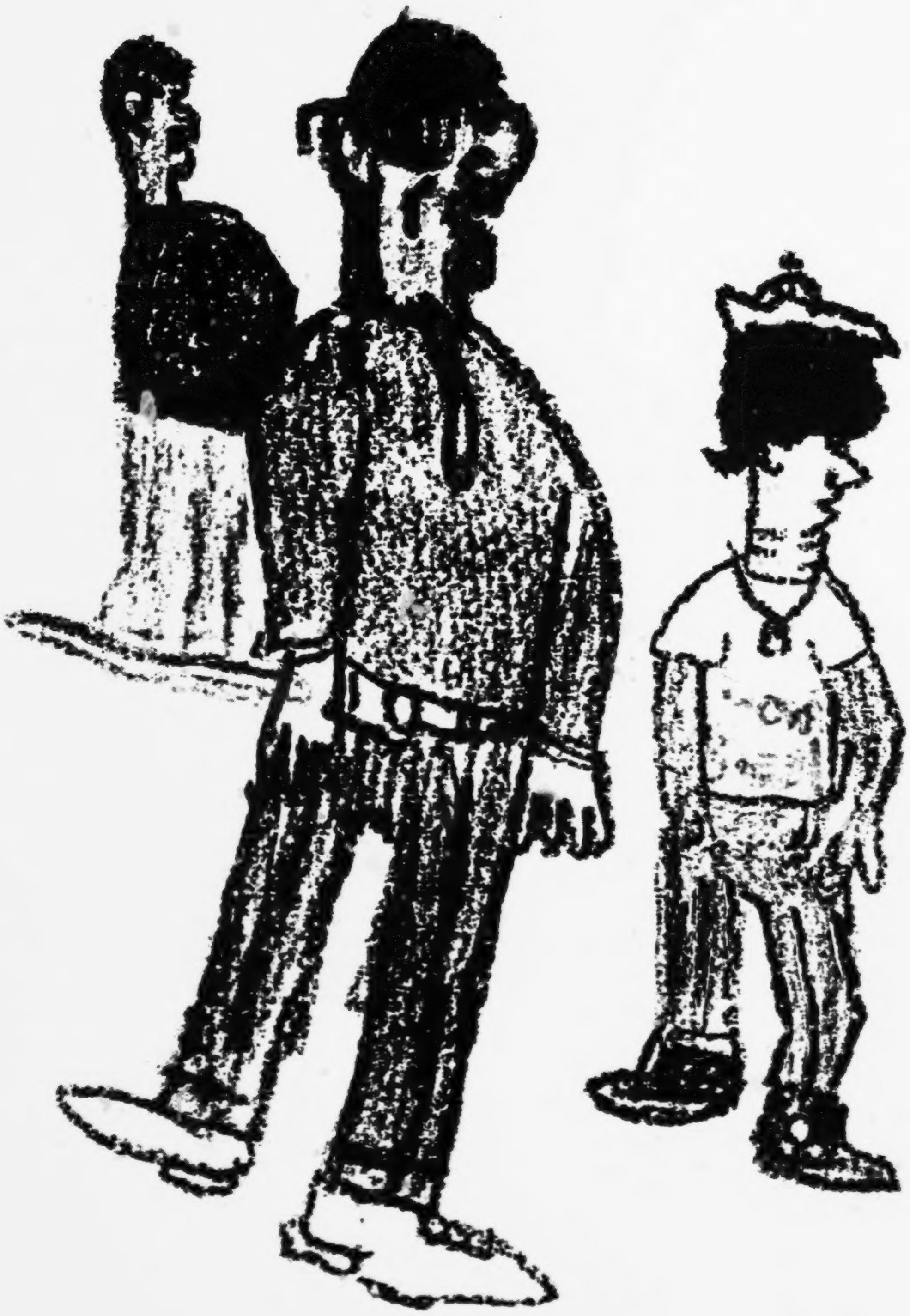

A Comparison of the Developmental Drawing Characteristics of Culturally Advantaged and Culturally Disadvantaged Children

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Preface

To those professionally involved in the field of art education as I have been during the past decade the task of constructing a scale for classifying children's drawings according to their graphic characteristics and hence learning something about their evolution might seem rather pedestrian. One's first reaction is likely to be, "Why do that, a substantial body of literature on the subject already exists." And so it does. But as I thought about this literature and the great names associated with it -- Lowenfeld, Read, Schaffer-Simmern, Arnheim -- it occurred to me that there did not exist, in spite of the descriptions of child art that these men provided, a scale that could be applied objectively to children's drawings. And without such a scale it is not possible to obtain some of the rather basic data that the field needs if it is to develop. Hence I became intrigued with the idea of formulating a scale and using it to assess what has been called the developmental stages found in child art. Thus the major motive for the study was not theoretical but, if you accept the distinction, practical. My major concern was one of developing a scale that could be reliably applied to children's drawings and which would therefore provide descriptive data useful for theoretical analysis.

Because of my experience working in Negro ghettos with culturally disadvantaged children at a time when they were referred to as juvenile delinquents rather than by euphemisms such as the "culturally deprived", "economically depressed" and the like, and because of the growing recognition on the part of educators and psychologists of the significance of the problems such children face, I decided to apply the scale to drawings made by children of this group and to compare their performance in drawing to the performance patterns of the culturally advantaged. I did this frankly in the hope of revealing levels of performance for disadvantaged children that were contrary to their performance levels in the linguistic-academic areas. The results that will unfold in the study will disclose what I found.

During the preparation of one's work and through its development one acquires debts owed to many people. To Francis S. Chase, Roald Campbell and Philip W. Jackson of the University of Chicago I am indebted for their counsel and encouragement. To Betsy Nann Hess who worked with me as a research assistant I wish to express my gratitude for careful and thoughtful assistance. Many of the ideas and refinements developed in this study grew out of my efforts to explain to her what I was after.

I also wish to express my gratitude to I. James Quillen and H. Thomas James of the School of Education at Stanford University for providing both the time and the intellectual climate for the work to be completed.

Finally, I wish to thank the teachers and principals of the seven schools that participated in this study for allowing a researcher to infringe upon their time in an effort to shorten the distance between the school and university.

Elliot W. Eisner
Palo Alto, California
1967

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The Problem

The study of children's art is not a recent phenomenon. Even before the turn of the century drawings made by children captured the interest of investigators in this country and in Europe and England. Yet despite this interest few systematic and objective studies have undertaken the task of constructing a scale useful for assessing the changing character or, as they have been called, developmental stages in child art. Most of the work dealing with developmental stages has been anecdotal in character. This work will be described in some detail later. What concerns us here is the need for objective procedures that will be useful to both teachers and researchers for assessing the developmental drawing characteristics found in child art. The major objective of this study was to produce a scale capable of providing such procedures.

The objectives of the study went beyond the hope of constructing such a scale however. It was also concerned with the application of the scale to drawings made by two radically different groups of children -- those coming from an upper-middle class suburban environment, one that is characterized by new and impressive houses with well-manicured lawns to those coming from hard-core slums, from old tenements in which fatherless families live in over-crowded apartments.

Still a third objective of the study was to determine the relationship existing between drawing development as assessed by the scale and language development. Insofar as drawing tasks elicit and employ perceptual skills it was considered useful and interesting to determine the relationships between language and perception -- at least as they might be assessed through the evaluation tools used in this study. Thus, the major objectives to which this study was directed were:

1. To construct a visual-verbal drawing scale useful for assessing levels of development in children's drawings.

2. To provide, through the comparison of drawings made by culturally advantaged and disadvantaged children, data that might help us understand their perceptual and cognitive development.

3. To determine the relationship between perception as manifested in drawing and language as assessed by a test of reading vocabulary.

To achieve these objectives 1093 children attending 46 classrooms selected from seven elementary and junior high schools participated in the study. These children came from grades one, three, five and seven in schools located in lower and middle class communities in the Midwestern part of the United States.

That children's drawings change as children get older has long been recognized. (5, 6, 7, 17, 40) From the first accidental arm movement which produces an undifferentiated scrawl or scribble to the highly skillful production of the illusion of the third dimension on a two-dimensional surface lies a variety of characteristics and, as shall be argued in the report, technologies through which a child represents his ideas and perceptions. Indeed, these technologies have been noted so frequently by students of child art that they have come to be called stages. These stages represent the mid-point or modal characteristic of children's drawing at particular levels of development. By identifying these modal characteristics the child's work has been classified with respect to the visual schema that it displays.

Furthermore, students of child art tend to agree upon many of these characteristics although the characteristics are labeled differently by various writers. While there is considerable agreement concerning the characteristics or schemas found in children's art, especially pertaining to the treatment of space, there is little agreement regarding the explanation of these characteristics. This is not surprising. For one, those who have investigated child art from the vantage point of art education have generally not been trained in psychological theory; hence much of the theory that has been produced by those working in this field has not been susceptible to empirical validation. Second, a psychology of art, one which accounts for, predicts and controls artistic learning specifically, has yet to be formulated. Efforts to theorize about the cause and character of children's art have employed concepts and procedures used in more general theories of human behavior. (10, 53) Whether such concepts are useful for explaining artistic behavior generally and qualitative thought in the visual modality specifically depends in part upon the questions one wants answered and the way they compare to other concepts and theories constructed especially for this realm of human activity. Third, the lack of theory adequate to account for artistic learning is due in part to a scepticism, if not downright rejection, of scientific theory regarding artistic performance by many of those who work in the field of art education.

Those most concerned with the artistic education of children are teachers and specialists in the field of art education. The background and training that most of these professionals bring to child art emanates from the field of art. Their allegiances and beliefs therefore tend to be more closely allied to the poetry of art than the precision of science. When beliefs become entrenched and when they are unsusceptible in principle to scientific verification, they tend to be incorrigible. Art teachers who have a commitment to a particular view of child development are unlikely to change their commitment if they consider scientific data irrelevant to art.

The most persistent and widely accepted view of child development in art education is one which is nativistic in character. (21, 25, 50) In this view the child is considered an unfolding organism who will come to realize his potentialities if the environment in which he lives is stimulating and supportive. The task of the teacher is considered primarily one of providing media and encouragement -- not instruction. It has been argued that the child's mind is qualitatively different from that of an adult and, hence, the adult should not attempt to foist his own values, preferences or skills upon the child -- especially in art where idiosyncrasy, originality, indeed, creativity are to be nurtured.

Teachers have been urged never to let a child copy or to trace, but rather to encourage him to express himself freely, to provide the child with large brushes, large sheets of paper, oversized crayons and other tools and media in which expressive "statements" can be made. (39) Some who have valued the naivety of child art have attempted to maintain this quality for as long as possible, keeping from the child adult influences even in the form of great works of art. (39)

Although the foregoing description of a pervasive intellectual commitment among many in the field of art education might appear as an unflattering caricature, it is not meant to be. Art education had during the twenties, thirties and forties ingested many of the assumptions and values of the Progressive Education Association. (24) During an era in which children in many schools were treated with inappropriate severity and in which art activities allowed relatively little opportunity for the exercise of the child's creative imagination, art educators were urging another form of educational practice. This other form, committed to the development of creativity, the release of potentiality, and to a personalistic and intimate relationship between teacher and pupil did not lend itself to the development of or sympathy with scientific theory or methods. The child was viewed as a young artist who needed to be allowed to draw, not taught to draw. (62) The teacher, viewed as a gatekeeper, was to unlock the creative potentialities of children. In such a climate the development of theory adequate for explaining and controlling the students' learning in art was unlikely.

Even though the intellectual climate of art education and the general adequacy of psychological theory did not lend themselves to the development of persuasive scientific theory concerning artistic learning, a number of investigators have developed positions of importance with which to view children's art products and their activity in its production. It is to some of the more important of these theories to which we now turn.

Theory and Speculation Concerning Child Art

One of the most sophisticated theoretical conceptions of the child's development in art has been advanced by Rudolf Arnheim in his book, Art and Visual Perception. (5) Working out of a Gestalt frame of reference Arnheim holds, as do other Gestalt psychologists, that perception develops from wholes to particulars through a process of perceptual differentiation. The processes of perception are given to the organism by nature and during the course of maturation the perceptual abilities of the child become increasingly more differentiated. Thus, the child sees less than an adult and Arnheim argues the simplified schemas the child draws are not a result primarily of limited motor skills but a reflection of his perceptual abilities. Thus, the child draws a circle before he draws a square because the latter is more highly differentiated. He draws what he sees, not what he knows -- according to Arnheim. Calling attention to the "fallacy" of the intellectualistic theory of child art Arnheim writes:

> "The oldest -- and even now most widespread -- explanation of children's drawings is that since children are not drawing what they are assumed to see, some mental activity other than perception is responsible for the modification. It is evident that children limit themselves to representing the overall qualities of objects, such as the straightness of legs, the roundness of a head, the symmetry of the human body. These are facts of generalized knowledge; hence the famous theory according to which "the child draws what he knows rather than what he sees." In substituting intellectual knowledge for sensory perception, the theory follows the kind of thinking that Helmholtz popularized in the 1860's. Helmholtz explained the "constancy" phenomena in perception -- that is, the fact that we see objects according to their objective size, shape, color -- as the effect of unconscious acts of judgment. According to him, persons obtain a "correct idea" of an object's actual properties through frequent experience; since the actual properties are what interests them for practical purposes, they come to overlook their own visual sensations and to replace them unconsciously by what they know to be true. In a similar intellectualistic vein children's drawings have been described by hundreds of investigators as representations of abstract concepts." (5)

Arnheim counters this explanation with one of his own when he argues:

> "The intellectualistic theory would hardly have monopolized the writings on the subject for such a long time if another theory had been available as an alternative. To work out a better explanation it was necessary: first, to revise the conventional psychology of perception; second, to become aware of the conditions imposed on artistic representation by the particular medium in which it occurs."
>
> "Children and primitives draw generalities and undistorted shape precisely because they draw what they see. But this is not the whole answer. Unquestionably children see more than they draw. At an age at which they easily tell one person from another and notice the smallest change in a familiar object, their pictures are still quite undifferentiated. The reasons must be sought in the process of representation.
>
> "In fact, as soon as we apply our revised notion of visual perception, a peculiar difficulty arises. I said that perception consists in the formation of perceptual concepts, in the grasping of integral features of structure. Thus, seeing the shape of a human head means seeing its roundness. Obviously roundness is not a tangible perceptual thing. It is not materialized in any one head or in any number of heads. There are shapes that represent roundness to perfection, such as circles or spheres. Even these shapes stand for roundness rather than being it, and a head is neither a circle nor a sphere. In other words, if I want to represent the roundness of an object such as the head, I cannot use the shapes actually given in it but must find or invent a shape that will satisfactorily embody the visual generality 'roundness' in the world of tangible things. If the child makes a circle stand for a head, that circle is not given to him in the object. It is a genuine invention, an impressive achievement, at which the child arrives only after laborious experimentation." (5)

Arnheim points out that when a child draws he confronts the difficult task of transorming objects perceived -- which is itself an act of construction -- onto a two dimensional surface. To do this he must create the structural equivalent of the perceived object on the drawing paper. This is for Arnheim an act in which the ingenuity of the child must be exercised. That he is able to create such structural equivalents is no mean achievement.

While the child copes with the problem of creating structural equivalents for objects perceived he tends to neglect the relationships existing among the objects drawn. Such neglect leads to what Arnheim aptly calls "local solutions", solutions to drawing problems which tend to neglect the wider contextual aspects of the drawing. Thus a child of four or five might draw a number of objects well while at the same time neglecting the spacial or aesthetic relationships that they have with each other.

Although Arnheim discusses drawing as invention and implies the cognitive aspect of this type of human activity, he does not discuss cognition or the role of learning explicitly nor does he mention how instruction might facilitate or hamper drawing development. The good gestalt is, apparently in Arnheim's view, a given -- it's in the nature of things as is the child's perceptual development.

The virtues of Arnheim's work are the fact that it is theoretically consistent, a variety of concepts are presented which are useful for thinking about the relationship between drawing and perception, and it relates a variety of theoretical work published in German to the views he presents in English in his own publication. The views that Arnheim advances are not, however, experimentally grounded nor does he provide systematic quantitative descriptions of data to support his assertions. We do not know from Arnheim's work the extent to which the characteristics of children's drawings can be altered nor do we know why individual differences emerge in drawing among children.

A second view which has had wide acceptance by lay individuals as well as by those in the field of art education has been advanced by Rose Alschuler and La Berta Hattwick. (3) It was in the late 1930's that Alschuler and Hattwick began their study of the easel paintings made by pre-school children. Working on the assumption that children's paintings, even those made by children of nursery school age, were not simply a matter of happenstance, Alschuler and Hattwick attempted to determine the relationship between the child's personality as manifested in his social behavior and the form and content of his paintings. Alschuler and Hattwick argue that as children mature they shift from a concern in their paintings with self-expression in directly emotional terms to a concern with literal representation. Following this belief they reason that by studying the characteristics of easel paintings made by nursery school children they would be able to identify relationships between the form and content of the paintings and the personality of the child as evidenced through his social behavior.

They reason further that the type of media a child uses affects the type of expression the child produces. While crayons are appropriate for expressing ideas, paints with their flowing, dripping quality are more appropriate for the expression of feeling. And since feelings better reflect personality than do "ideas", which are under greater conscious control, they believe that easel paintings can be used effectively for the study of personality.

Alschuler and Hattwick distinguish between the function of media this way:

> "Our data, both qualitative and quantitative, indicate that very young children choose and use crayons to express quite different needs, moods, and meanings from those expressed when they work with easel paints. Crayons tend to be associated with awareness of outside standards and with the desire to communicate with others. In contrast to when they paint, when children crayon they more often tend to name their work and show it to adults, are concerned about the finished product, and are perhaps critical of it themselves. Relatively soon they turn to representation with crayons. Even before they can make representative forms they will tease out their wavy scribbling and call it writing. They are seemingly conscious of crayons as a medium for communication, for expressing ideas.
>
> With painting, on the other hand, children tend to express how they feel, regardless of what others think. The child who sits at the crayon table and mades a recognizable, detailed human being may on the same day go to the easel and produce only a colored mass. Our data reveal crayons as a medium for expressing ideas, whereas easel painting is more often a medium for expressing feelings." (2)

Using a case study approach in their analyses the researchers attempted to identify general tendencies in the child's painting that are associated with the psychological traits he displays in social situations. According to Alschuler and Hattwick, the space usage of the painting may be used "as a sample of the child's usage of his environment. How he reacts to this part of his environment is likely to indicate his reaction to the larger environment." (2) They go on further to analyze the import of various colors and various painting procedures such as overpainting and indicate that size, color, placement, space usage are related to the personality characteristics the child possesses but caution readers that data secured from the analysis of easel paintings cannot be used confidently to predict behavior. It could be used, however, as one important data source. And they conclude that their findings have implications for "all adults who would impose patterns of work on children rather than encourage them to express themselves freely in creative media." (2)

This last observation is in keeping with the dominant view described earlier regarding the appropriate conditions for fostering the child's creative development. Alschuler and Hattwick's views were and are consonant with many of those working in the field of pre-school education.

It is worth noting that the supposed relationship between art and personality is a belief that is both persistent and widespread. It is a rather widely held assumption that the artist expresses or projects his personality through his work. This assumption is manifested in several ways in the field of art. It is not unusual, for example, to find young art students anxious to discover their true style -- as if they had a particular style of painting that lay latent within them. Recent research by Beittel (10) suggests that styles of work in drawing are much more flexible than had previously been supposed and that experimental methods can alter drawing styles significantly.

The assumption that drawings reflect the deeper levels of personality is not only held by many artists and art students but by those who work in the field of art therapy. Margaret Naumberg (60), Emmanuel Hammer (37), Ernst Kris (41), Karen Machover (52) are only a few who have used drawings as indicators of deep-seated personality dispositions. As a reflection of the unconscious and as a non-verbal and pre-verbal mode of expression drawing and painting are supposed to provide a direct access to the unconscious and pre-conscious processes since they tend to by-pass many of the defense mechanisms employed in controlling more cognitive processes.

A third view of children's art has been advanced by Florence Goodenough (34) and Dale Harris (38). This position which was developed originally by Goodenough in her 1924 doctoral dissertation at Stanford University views children's drawings as data useful for determining their intellectual maturity. (34) Intellectual maturity is conceived of by Goodenough and Harris as the level of concept formation that the child has attained. They argue that the ability to form concepts is an intellectual ability requiring that the child recognize similarities and differences among a group of particulars. If these distinctions can be made and if the child is able to recognize an instance of the class when he confronts a particular that shares its characteristics, the child can be said to have attained a concept of that class.

According to Goodenough and Harris children's drawings reveal the extent to which such concepts have been formed. The amount of detail that appears in a child's drawing, especially in the drawing of a human figure, is an index of the intellectual maturity the child has attained.

Describing the rational underpinnings of their work Harris writes:

> "The child's drawing of any object will reveal the discriminations he has made about that object as belonging to a class, i.e., as a concept. In particular, it is hypothesized that his concept of a frequently experienced object, such as a human being, becomes a useful index to the growing complexity of his concepts generally." (38)

Goodenough and Harris point out, however, that the identification of personality characteristics is not likely to be done as easily. Thus their view of child art and the assumptions they make about its genesis and development appear to differ significantly from those of Alschuler and Hattwick, Machover, Hammer and others concerned with the use of drawings as data for developing an understanding of personality. In his book Harris concludes his section on the clinical and projective uses of children's drawings by saying:

> "A survey of the research and clinical literature is persuasive; the projective hypothesis as it applies to human figure drawings has never been adequately or consistently formulated, and systems for the evaluation of such drawings have, for the most part, been exceedingly loose. Consequently, the assessment of drawings by such methods very often shows modest reliability and low validity. The more rigorous the conditions of the experiment -- control of variables, matching of control samples, and the like -- the lower the validity of the human figure drawing as a measure of affect and personality." (38)

But if it is true that children's drawings cannot be used with validity as a data source for understanding personality, similar objections have been made by Medinnus, Bobitt and Hullett (55) about the validity of the Draw A Man Test. The assessment of an ability, especially a complex of abilities such as constitute intelligence, is supposed to be rather stable. According to Anastasi (4) psychological traits are generally not amenable to rapid alteration. Yet in their research Medinnus, Bobitt and Hullett (55) demonstrated that children who had an opportunity to learn how to construct a puzzle figure of a person were able to significantly increase the scores they received on the Draw A Man Test after receiving the experimental treatment. The authors point out that if scores on the Draw A Man Test can be altered easily without changing performance on other tasks in which intelligence is exercised, the theoretical relationship between the Test and intelligence can be brought into question.

Whether the Draw A Man Test "really" measures intelligence or something else depends, in part, on one's conception of intelligence. Construct validation of the test suggests that the claim the authors make about the role of concept formation in drawing appears plausible. While the ability to form concepts is clearly not the whole story regarding the skills one needs to draw, Goodenough and Harris make no claim that it is. Indeed they emphasize repeatedly that the Draw A Man Test is not suitable for measuring artistic aptitude, talent or artistic creativity. ( ) Its major type of validation is concurrent validity with computations of correlation with other tests of intelligence yielding coefficients of .55 to .75. (38) Given the brevity of the test in terms of effort and time needed to take it, its concurrent validity is impressive.

The point to be emphasized here, however, is not the validity of the Draw A Man Test but the theoretical position that its authors use to account for drawing performance. For Goodenough and Harris the child's level of concept attainment is reflected in the drawings he produces; hence, they argue a major aspect of drawing is cognitive in character.

A fourth view of child art has been advanced by Norman C. Meier. (56) It was at the University of Iowa during the 1930's that Meier established a laboratory for the study of artistic aptitude. During the period in which the laboratory was in operation a variety of studies of children with and without artistic talent, studies of artists and their life histories and studies of creative abilities were undertaken. In a summary article published as a Psychological Monograph (56) in 1939 Meier reports the major findings culminating a decade of research.

The most significant finding from Meier's viewpoint is the identification of six factors which contribute most to artistic aptitude. These factors, half of which are a function of heredity and half a function of environment are interactive although Meier does not describe how this interaction occurs. The first three factors which are a consequence primarily of heredity are manual skill, energy-perseverance and intelligence. The last three factors, these a consequence of nurture primarily, are perceptual facility, creative imagination and aesthetic judgment. Meier is quick to point out that the type of heredity he is referring to is not direct inheritance from parents but what he calls constitutional stock inheritance. This type of inheritance refers to the genetic contribution of relatives whose genetic endowment has apparently affected the genetic constitution of the individual. Meier found, for example, that children with artistic aptitude had a larger proportion of relatives who were craftsmen, artisans or artists than children who apparently did not possess such an aptitude. Meier points out that factors emanating from constitutional stock inheritance *must* be present for an individual to display artistic aptitude. While the genetic contribution is not a sufficient condition, it is a necessary one; thus Meier emphasizes this aspect of aptitude more than those traits that are acquired.

It does not require much in the way of extrapolation to recognize that the view that Meier has advanced is consonant with the widely accepted belief that artistic ability is a consequence of talent and talent, it is believed, is a dichotomously distributed "gift" possessed by a precious few. Unlike the beliefs of the Progressives who were committed to the idea that all children had the potentiality to think and act creatively, the generally prevailing lay view is that only a few individuals have artistic talent. It is not uncommon to hear people exclaim when asked about their ability or talent in art that "I can't draw a straight line with a ruler."

The implications of such a belief for educational practice are enormous. If it is true that only a few are gifted with artistic talent it could be argued cogently that the educational task should be one of identifying those who possess such gifts and of providing resources for their development. The vast majority without talent would be better advised to employ their energies elsewhere.

It is well to reemphasize the fact that Meier does not argue for *either* a nature *or* a nurture theory of artistic ability. He repeatedly points out the importance of interaction. But since certain factors must be present genetically for interaction to occur, their existence is a precondition for the development of artistic aptitude. Even with an interaction viewpoint the problem of selecting students who might profit from environmental conditions appropriate for developing artistic ability becomes crucial. A major aspect of educational planning for one who holds this view is one of selecting talented pupils and providing them with opportunities to work in art.

A fifth view of child art has been developed by one of the most influential art educators working in this country during the past thirty years. Viktor Lowenfeld arrived in the United States in 1939 after having worked extensively with blind children of the Vienna School for the Blind.

The Nature of Creative Activity (48), his first major work translated in English, was followed in 1947 with the publication of Creative and Mental Growth (50). In the latter work Lowenfeld argues a view of child development which emphasizes the relationship between mental health, self concept and creativity. For Lowenfeld, whose work has been published in seven languages and who has had considerable influence on teacher education in art, each child possesses a capacity for creative development. The task of the teacher is to arrange the conditions whereby these potentialities are realized. When the teacher or the parent place pressure on the child, when they allow him to copy, trace or use coloring books, the capacities the child has for creative work are stifled. The way creativity may be best realized is for the child to be exposed through all of his senses to the qualities of life. Through direct experiences with tactile, visual and audial phenomena the child's imagination and perceptual powers are developed.

Lowenfeld argues further that the development of the child is wholeistic in character. Taking a leaf out of the Progressives notion of the "whole child", Lowenfeld points out that the form and content of a child's drawing is affected by, for example, his particular stage of social development. The child's drawings of group activity reflect sociability and the groupiness of the gang age. (50) In addition the child's drawing reflects the values he places upon experience. Children exaggerate the size of objects in their drawings when they take on special significance. (50)

The most systematic theme, however, which pervades Creative and Mental Growth is the conception of stages of development in child art. Lowenfeld lists these stages as:

1) The Scribbling Stage (2 to 4 years of age)
2) The Pre-Schematic Stage (4 to 7 years of age)
3) The Schematic Stage (7 to 9 years of age)
4) The Gang Age (9 to 11 years of age)
5) The Stage of Reasoning (11 to 13 years of age)
6) The Crisis of Adolescence.

The pervasive assumption in Lowenfeld's writings about these stages is that they are natural aspects of human development. In this view he shares some commonality with Gestalt psychologists. The development of a stage is like the unfolding of a genetic program and although there are differences in rate of development among children as well as differences of an idiosyncratic variety, the over-all pattern and pace of development is remarkably similar. The general implication of Lowenfeld's writings is that the child must pass through one stage before he is ready or able to perform at the next level of development.

Lowenfeld departs from the Gestalt psychologists, however, by placing greater emphasis upon the factors that militate against development of the child's perception and creativity and by his concern with the contextual and social aspects of artistic behavior. Lowenfeld, as educator, was profoundly concerned with the normative aspects of education; with the way it could shape behavior in positive or negative ways. In Creative and Mental Growth Lowenfeld argues that art is an educational tool that could cultivate man's sensibilities, foster cooperation, reduce selfishness and above all develop a general ability to function creatively.

Although Lowenfeld's work represents one of the most extensive efforts to classify and analyze children's art, it contains numerous assertions that lack adequate documentation. The stages that are described are not the result of empirical studies using scientific controls to insure objectivity, but insightful, even if at times dogmatic, conclusions drawn from years of experience working with children. Such an approach in the hands of a sensitive observer has much to recommend it but it tends not to be easily corrected. Observation and insight give way to beliefs which are difficult to alter because the ground rules for alteration were not employed in the development of the observations initially. Furthermore, Lowenfeld's work does not benefit from the test that a rival hypothesis could provide. Whether creative ability is generic or specific is as yet undetermined; yet Lowenfeld implies strongly that it is generic and suggests that evidence for this has been found. Whether copying or tracing are in fact detrimental to the child's artistic growth is still not known; Lowenfeld states "Never let a child copy." (50) These and other conclusions are arrived at in Creative and Mental Growth and yet such conclusions are problematic in character. Yet, there is little question that Lowenfeld's views of child art were more comprehensive and systemic than the views of others working in the field at about the same time.

A set of concepts that has been given rather special attention by Lowenfeld is his effort to account for the character of children's art are those of haptic and visual modes of perception. (50) According to Lowenfeld as children mature a proportion of them -- about 70 percent -- orient themselves to the world in one of two ways. Those whose perceptual orientation is visual tend to see the world as spectators who view phenomena in a literal sort of way with little affective or kinesthetic regard for the phenomena being encountered. The objective qualities of visual phenomena are the qualities they tend to perceive and hence the drawings and paintings they produce tend to be representational in character.

The haptic individual interacts with the world as a participant rather than as a spectator. He undergoes experience in a highly affective and kinesthetic way; hence his drawings and paintings are not literal but emotionally exaggerated. Haptically minded individuals tend to produce drawings that represent the feelings they undergo as a result of perception rather than representations of their visual perception of the object's qualities.

Lowenfeld suggests that these perceptual traits are genetically determined; hence art teachers should not require or expect visually minded individuals to produce haptic characteristics in their drawings. It should be noted that the published empirical evidence for the existence of these two types of individuals has not been validated on art tasks but on tasks requiring the production of words and the recognition of forms. Until such validation occurs the view of haptic and visual individuals should be considered interesting speculation deserving further study.

Still a sixth view of children's art has been advanced by Sir Herbert Read, one of the most widely published critics in the twentieth century. In his book Education Through Art (63), Read develops a conception of art that has as its intellectual parent the ideas developed by Plato in The Republic and The Laws. Read considers art a general process through which man achieves harmony between his internal world and the social order in which he lives. Art, he writes in The Redemption of the Robot (65), is based upon two general principles; first, the growing human should come to understand the relationships and similarities existing in an apparently diversified world. This principle is based on the value of unity and the contribution art can make toward the achievement of unity. The second principle is that the child, to quote Rousseau, "should depend upon things only." (65) This is to say that the child should learn through the cultivation of his sensibilities. He should learn to know by coming into direct contact with objects through his senses for it is only through such contact that a firm foundation can be built for intellectual abstraction.

In attempting to account for child art, Read uses Jung's conception of psychological types and his conception of the collective unconscious in a way similar, but not identical to, the theory of recollection that Plato advanced in The Republic. According to Read, the characteristics of child art are a function of archetypes which have been left as traces in the mind through the evolution of the human race. Certain symbols, Read claims, such as the mandala, the circle, and the star reappear in children's drawings regardless of the culture in which they live. These recurrent symbols provide evidence of the common humanity of man and of the potency of art to reveal this commonality. Education through art, writes Read, is education for peace.

Regarding the psychological types that are revealed through children's drawings and paintings Read writes:

> "These parallelisms between types of ancient and modern art on the one hand, and types of temperament or personality on the other hand, may not be exact, and in any case we cannot too often repeat that in their purity all such types are hypothetical. But enough evidence has been brought forward to show that several distinctive types, both of art and of personality, do exist and are interdependent, and this is a factor of supreme importance in any consideration of the educational aspects of art. Art, we may say, has almost universally been taught according to one standard -- the standard of the extraverted thinking type. In more progressive schools the standard of the introverted thinking type has been implicitly recognized. In a few others a complete freedom of expression has been allowed, though without any attempt at classification or integration. But obviously the teacher should be in a position to recognize the type-attitudes in all their variety, and to encourage and guide the child according to its inherited disposition. Education, at this stage, should imply the widest principle of tolerance.

> "To what extent art should be used as a key to pathological conditions will be considered in another chapter, but this would obviously be a task beyond the range of the normal teacher. The first aim of the art teacher should be to bring about the highest degree of correlation between the child's temperament and its modes of expression." (63)

One cannot help being impressed with the range of scholarship that permeates Read's writing. He freely draws upon ancient humanistic resources as well as modern scientific research to support the ideas he advances. Yet from this wealth of material emerges an unclear eclecticism that leaves the reader in a persistent state of wonder regarding the meaning Read intends. The hypotheses he formulates to account for child art are not hypotheses in a formal sense and are stated with such ambiguity and vagueness as to render them unsusceptible to scientific verification. The theory of types he supports and its relationship to the character of child art has yet to be demonstrated empirically. The evidence he provides is by analogy rather than through experiment. And aside from the laudable goals Read embraces for education and the important position he assigns to art in achieving these goals, he offers little direction to those who would interpret children's drawings with the intention of facilitating the child's growth in this area of human activity. In short, Read's statements on art, children, and education are stimulating and scholarly but in their present form are outside the realm of empirical validation.

A seventh view of child art, and the last one to be examined here, has been advanced most recently by June McFee in her book Preparation For Art (53). Having had the benefit of training in the behavioral sciences as well as in the practice of art, McFee has attempted to apply concepts and theories found in the former to explain what takes place in the latter. In this effort she has constructed what she calls a "perception-delineation theory". In this theory four factors come into play:

1) The readiness of the child -- This includes factors such as the child's physical development, his intelligence, perceptual development, response sets and the cultural dispositions he has acquired,

2) The psychological environment in which he is to work -- This includes the degree of threat or support existing in this environment, the number and intensity of rewards or punishments,

3) Information handling -- This factor is affected by the child's ability to handle detail, his intelligence, his ability to handle asymetrical detail and the categories he possesses for organizing perception, and

4) Delineation skills -- This includes the child's ability to manipulate media, his creative ability and his ability to design qualities of form.

In differentiating these four factors McFee has established a broad base to her conception of the factors affecting the child's development in art. There can be little question that the factors identified above can have an important effect on the quality of work in art that the child can produce -- such factors would affect almost any human activity. If a comprehensive and useful theory of child art -- indeed, artistic learning in general -- is to be developed it is reasonable to assume that these factors will need to be taken into account.

An important limitation in McFee's work is the fact that the concepts that she identifies are not developed within a single theoretical frame of reference; the concepts are inter-disciplinary. The virtue of such an approach is that it provides a broad view of the phenomena being studied but at the same time it tends toward inconsistency and ambiguity, especially if terms are derived from theories whose assumptions are mutually exclusive.

In addition, the key concepts or points in the perception-delineation theory are not operationally defined and between points one and three, for example, there appears to be considerable overlap. Yet the effort that McFee has made is valuable precisely because she called attention to the need for systematic and experimental studies of the various factors identified. If response sets, for example, effect the characteristics of delineation in drawing, it might be possible to alter response sets experimentally to determine their effects. If perception requires classification and categorization, language might be used to help children acauire more elaborate forms of categorization. What types of measures, specific to the visual arts, would provide operational definitions of the factors identified in each of the four points that McFee identifies in her theory? The significance of McFee's contribution lies not in its detailed description of the function of complex variables, their measurement and experimental manipulation, but in the broad schematic rendering of some of the factors that appear important to those who would understand the development of child art.

Up to this point seven views of child art have been described in brief and in somewhat over-simplified terms. None of the theorists or theories that have been presented are as neat as has been suggested; but the purpose has not been one of explicating and critiquing the nuances of theory but that of pointing out the diversity of views that have been advanced. Categories are always simpler than the phenomena being categorized and the adequacy of categorizing in any event depends upon the function it is to serve. In this case it is to make plain some of the major differences in several important views of child art.

By way of review we find that one conception of child art, one argued by Arnheim (5), is that which emphasizes the growth of perception through a process of perceptual differentiation. This process is accompanied by the increased differentiation of graphic forms created by children as they create two-dimensional structural equivalents for the objects they perceive. Children, says Arnheim, draw what they see, not what they know.

A second view urges the importance of personality traits in affecting the painting characteristics of pre-school children. While the effect of personality is especially important when pre-school children use fluid media such as paints, it is never wholly absent from the work of any artist. The view Alschuler and Hattwick present (3) for pre-school children is similar to views advanced by those concerned with art therapy and with the use of art as data for psychological diagnosis. For such individuals art is manifestation of personality.

A third view sees child art as indicative of concept formation and thus an indication of general intelligence. Goodenough (34) and Harris (38) present this view in their work. Thus the act is drawing is considered a cognitive activity in large measure and is affected by many of the abilities that affect performance on tasks not associated with drawing.

Norman Meier (56), in a fourth view of child art, emphasizes the importance of constitutional stock inheritance and considers art ability or art aptitude a result of an interaction between genetic traits and environmental conditions, identifying six factors which affect art aptitude.

A fifth view, this one developed by Viktor Lowenfeld (50), emphasizes the unfolding character of chilren's developmental stages and urges teachers to avoid intervening in the natural, hence, appropriate, course of the child's artistic development.

According to Lowenfeld, this natural course yields people with two different visual orientations to the world. The haptic individual relies mainly upon affective, kinesthetic responses for contacting his environment while the visually minded perceives the world in a more literally visual way. These types, Lowenfeld suggests, are genetically determined.

Herbert Read (63) theorizes that child art is affected by the particular personality type the child possesses and by an array of premordial images or archetypes "which have found their way from the unconscious levels of the mind." (65) Art, says Read, "is a complete fusion of the two concepts (art and education) so that when I speak of art I mean an educational process, a process of upbringing; and when I speak of education I mean an artistic process, a process of self creation." (65)

In a seventh and broad view of child art McFee (53) identifies four factors or points which affect the child's performance in art: his readiness, his ability to handle information, the particular situation in which he is to work, and the delineation skills he possesses. Although these points or factors are suggestive of needed research they are not defined operationally in McFee's theory. They do remind the student of child art, however, of the fact that artistic behavior is a function of multiple causality.

Research on the Development of Child Art

The foregoing section has identified some of the more important views of child art. From this account it is apparent that the positions taken differ and that when translated or extended with respect to instruction or curriculum development would lead to radically different educational practices. But what of empirical research dealing with the cause and character of children's art? What have systematic empirical studies revealed about the developmental sequence of child art?

A review of the relevant research indicates that although there is a great deal of literature describing stages of children's art there are few empirical studies which describe in statistical terms such variables as the modal characteristics of children's drawings at various ages, the variability found at these age levels, the differences, if any, between the sexes regarding drawing characteristics, the special qualities produced in drawings by various sub-cultures within a national culture, the rate of change in drawing characteristics over time or the influence of environmental conditions on drawing characteristics.

With the exception of a scale used by Lewis (45, 46), to my knowledge no scale has as yet been published that can be used easily and objectively by researchers or teachers who are interested in the variables identified above. There is at present no standardized measure of artistic performance published which presents norms for subjects differing in important regional, educational or ethnic characteristics. And while the major goal of art education is not simply to assess child development in art, it appears reasonable and useful that members of the field of art education have at least rudimentary tools that describe in relevant ways those characteristics of thought and behavior with which they are concerned.

One recent effort to describe the drawing development of children appears in *Understanding Children's Art for Better Teaching* (43). Written by Lark-Horovitz, Lewis and Luca, this work draws upon a variety of research studies and other types of material to describe the development of child art. According to the authors three major stages or periods of development can be identified. These are 1) the scribble stage,
2) the schematic stage and
3) the true-to-appearance stage.

As a gross description of some characteristics these three distinctions are useful. It should be noted however that other investigators label the stages differently and identify many more than the three previously mentioned. Lowenfeld (50), for example, identifies seven stages, Burt (17), seven, Read (63), six, and Kellog (39), whose major interest and experience is with children of nursery school age, identifies twenty types of scribble or schemas created by children of pre-school age. The number of stages that investigators identify is related, I think, to both their purposes and their perceptiveness. Using data adapted from Munro, Lark-Horowitz and Barnhart, the authors of Understanding Children's Art for Better Teaching present a table which provides data for children from ages six through fourteen on characteristics such as representational level, color usage, proportion, use of medium, line treatment, area treatment and composition arrangement. The identification of such variables of child art is an important first step in constructing the type of scale that is needed, but what is needed with such a scale is a detailed description of the characteristics of the population from which the drawings were secured and the particular procedures used in judging, scoring and statistically treating the data. This information has been presented in scant fashion in most of the reports concerning child art.

Early studies of child art undertaken around the turn of the century were published by European, English and American investigators. One of the earliest of these was published by Corrado Ricci (67) in 1887 under the title "The Art of Little Children". In this study Ricci describes the circumstances which led him to study children's art (the fact that he was caught in a thunderstorm and sought the seclusion of a portico on which he discovered a variety of drawings, some obscene at the higher levels of the wall to the drawings of little children near the bottom) and presents a description of the characteristics he found as well as the reasons for their presence. According to Ricci the rule that guides children in their art is "Simply upon this: the child describes the man and things instead of rendering them artistically. They try to reproduce him in his literal completeness, and not according to the visual impression. They make, in short, just such a description in drawing as they would make in words." (67) Children draw, according to Ricci, what they know rather than what they see. But like other early investigators Ricci does not provide a systematic description of the several thousand drawings he subsequently studied in the course of his investigations.

A more systematic study of child art was reported in 1892 by Earl Barnes (6), a Professor of Education at Stanford, which endorses many of the conclusions arrived at by Ricci.

Using some of the tools and procedures of the newly developing sciences of education and psychology, Barnes reasoned that since it was not possible to get inside the child's mind "to study his subjective activity", it might be useful to study his drawings in order to better understand how he thinks andfeels. Given the period in which the study was undertaken, it is a remarkable piece of research. For this study Barnes collected over 15,000 drawings made by children in California and in the middle and eastern states. These drawings made by children from age six through sixteen were then analyzed with respect to the subject matter they portrayed and the formal characteristics they presented. All of the drawings were made under the influence of a single stimulus, a poem especially created to be of interest to children. By holding the stimulus constant Barnes was able to identify those aspects of the poem that were drawn most frequently. From his work Barnes arrived at the following conclusions.

> "1. Drawing is for the yound child a language, a means of expressing ideas.
>
> 2. Children naturally adopt symbols and conventional forms to express what they want to say.
>
> 3. The courage to express ideas through drawing increases in California children until they are thirteen or fourteen years old and then steadily decreases.
>
> 4. The child thinks in small units; his intellectual processes are fragmentary and broken.
>
> 5. Children like to draw large distinct figures, expressed with few lines.
>
> 6. Children draw full-faces until they are nine years old, and after that, profiles.
>
> 7. In drawing figures children are most interested in the head; hence they draw single figures facing their left.
>
> 8. A child uses color naturally for decorative effect; for the drawings, he prefers strong black or white.
>
> 9. Children select the dramatic points in a story well, and their pictures are naturally full of movement.

> "10. In a story a child is most attracted by the scene just preceding the catastrophe.
>
> 11. The humane instinct in children is far stronger than the destructive instinct.
>
> 12. There is very little difference between the drawings made by the boys and those made by the girls. 3,043 boys drew 7,596 pictures to illustrate the story, while 3,350 girls drew 7,622 pictures, showing that the boys were a little more expressive than the girls. The girls reach their most expressive point at thirteen, while the boys reach that point a year later. The boys emphasized the rescue scene more than the girls did, drawing 1,414 scenes, while the girls drew but 1,193; in the treatment of the other scenes, they were about alike. One could not say that the boys were more daring in their conceptions than the girls were, nor that the girls dwelt more upon details than the boys did." (6)

But perhaps the most signigicant conclusion that Barnes reached is that drawing for young children is a form of language and that the graphic forms the child uses constitute his visual vocabulary. The child draws not what he sees, according to Barnes, but what he knows; hence, children's drawings are an important data source for those interested in understanding cognitive development.

The studies that were carried out in Italy and the United States were paralleled by studies in Germany, France and England. In Germany a school inspector named Kerschensteiner (40) conducted a large scale study of children's drawings during 1903 through 1905. After collecting and analyzing about 100,000 drawings made under standardized conditions, Kerschensteiner arrived at three main categories of children's drawings. These he called 1) purely schematic drawings, 2) drawings which imitate visual appearance and 3) drawings which give the illusion of the third dimension. Like Barnes' work, Kerschensteiner's was characterized by a systematic effort to quantify those characteristics found in child art by age level.

In France Cleparedè (19) studied child art and in England in the second and third decades of this century Burt (17) attempted to both describe and account for the art of the normal and feeble minded. According to Burt child art develops through a series of stages. The stages he identifies are as follows:

1. Stage of scribble
2. Stage of line
3. Descriptive symbolism
4. Logical realism
5. Visual realism
6. Repression
7. Artistic revival.

Burt goes on to point out that the cohesiveness or gestalt quality of the child's drawing increases as he matures, this quality being one of the important characteristics that distinguish the drawings of normal children from those who are feeble minded. (17)

One of the most systematic attempts to analyze the changing character of child art was carried out by Florence Goodenough (34) in the 1920's. Although Binet had used certain tasks related to art in his initial tests of intelligence, it was not until Goodenough's work in the 1920's that drawings were used as a primary vehicle for assessing intellectual maturity.

Studying and working about a decade after the Child Study movement was at its height, Florence Goodenough attempted to determine the extent to which "the nature of children's drawings were conditioned by their intellectual development". In undertaking this task Goodenough realized that although there had been dozens of "studies" of child art carried out since the turn of the century, few of these studies provided an objective means for assessing child art. The use of statistical procedures was infrequent, and in addition some of the investigators were interested in other than intellectual factors. Lambrecht (42), for example, was interested in racial similarities and differences with special reference to the theory of recapitulation, Cleparedè (19) was interested in the relationship between art aptitude and general intellectual ability. Goodenough was concerned with the development of an objective procedure for assessing children's drawings since she believed that the child's intellectual development could be ascertained through their examination. Her Stanford dissertation of 1924, under the direction of Calvin Stone and Lewis M. Terman, represented one of the earliest modern efforts to scientifically scale and rate children's drawings.

Goodenough succeeded not only in developing a scale so objective in character that it has since become a standard instrument for assessing intelligence in young children but in demonstrating the significant relationship that children's drawings have to their level of conceptual maturity. The original scale developed in 1924 has been revised and restandardized in the 1960's by her former colleague and collaborator Dale Harris. In 1963 Harris published Children's Drawings As Measures of Intellectual Maturity (38) in which he presented a short form that can be used for scoring drawings, a new Draw A Woman Scale and new norms for the Draw A Man Scale. Although Harris attempted to extend the scale well into the adolescent period this effort proved unsuccessful.

While Goodenough's work presents a model of the carefully executed study of child art, it does not attempt to assess the artistic or spacial character of children's drawings or to plot developmental patterns. Goodenough's primary concern was to reveal the relationship between intelligence and the characteristics of children's drawings. The validity of the scale is established by demonstrating large significant correlations between drawing scores, intelligence and school achievement scores. The scientific assessment of "developmental stages" was yet to come.

An ingenious procedure for assessing spacial representation and picture preferences was developed by Lewis in 1961 (45). In her study of drawing ability and picture preference Lewis attempted to test four hypotheses:

1) A relationship exists between grade level of pupils and method employed to indicate spatial characteristics in drawings.

2) The relationship of grade level to method employed in indicating spatial characteristics is independent of sex.

3) Differences exist in preferences among pictures in which spatial characteristics are revealed with varying degrees of clarity.

4) Picture preference is independent of sex.

In order to test these hypotheses 27 intact classes of children enrolled in kindergarten through grade eight in five public schools were asked to make drawings of three objects representing three types of space -- spherical, cubic and spatial. To secure these drawings three stimulus objects were selected or constructed.

> "Spherical space was objectified by a green glass globe circled with a yellow band; cubic space by a four-sided, flat-roofed toy house; and spatial depth by a diorama of a landscape in which a row of trees was arranged parallel to the sides of the containing box and was flanked by two rows of fences, each row consisting of three parallel fences and oriented at 90 degrees to the opposite row of fences and at 45 degrees to the side of the box and to the row of trees." (45)

In order to assess the level of development predicted for drawings of each of the stimulus objects five drawings of each object were made, each representing a different developmental level. After each subject made a crayon drawing of each of the stimulus objects the drawings were rated by independent judges using the five drawings in each of the three sets that had previously been made. The percentage of agreement among three judges was 91.4. Lewis found that a relationship exists between the grade levels of the subjects and the method employed to indicate spacial characteristics in drawings, that differences exist in preferences among pictures in which spacial characteristics are revealed with varying degrees of clarity, and that no sex difference existed in either the subjects' production of spacial characteristics or their preference for spacial characteristics at varying grade levels.

One of the rare efforts to attempt to affect the rate of drawing development in young children was undertaken in 1946 by Elizabeth Dubin. Using an age-grade scale of graphic development first suggested by Monroe, Dubin (30) attempted to determine if nursery school children could, through discussions about their work, increase their level of or stage of graphic development. The experimental sessions consisted of discussions with the experimenter at which questions or comments designed to move the child to one stage beyond where the child was at the time were asked.

Using nursery school children who were matched with respect to age, sex and interest in art Dubin was able to demonstrate that the experimental treatment she employed was effective in increasing the stage of graphic representation displayed by the experimental group. Dubin concludes from her study:

> "This result indicates that easel painting involves a behavior-pattern sufficiently highly developed and yet still sufficiently malleable at the age of two years, as to be easily influenced by training. From this it would follow that in the nursery school situation it would be possible to develop an organized art program even for the two-year-olds which, while involving no negative effects on spontaneity and creativity in artistic behavior, could at the same time have a positive value in advancing children's drawing level." (30)

There have of course been other studies of children's development in drawing but as indicated earlier most of these studies have been case studies or anecdotal in character. From these works, from theoretical speculation and from the more systematic and objective research efforts certain generalizations about child art can be drawn. The following eighteen generalizations have been drawn from the work of some of the more important investigations.

1. The characteristics of children's art change in relation to the child's chronological age. (Lowenfeld (50), Burt (17))

2. The level of complexity in children's art increases as children mature. (Goodenough (34))

3. The sense of cohesiveness or gestalt quality in drawing increases as children mature. (Arnheim (5))

4. Children tend to exaggerate those aspects of drawing that are most meaningful to them. (Lowenfeld (50))

5. Children draw primarily what they know at the early stages of development but attempt to draw primarily what they see at the later stages. (Alschuler and Hattwick (3))

6. The early scribbles of children tend to be dominated by the desire for kinesthetic satisfaction primarily. (Arnheim (5))

7. From the beginning scribbles found in child art there develops a variety of shapes which tend to reoccur in a developmental pattern. (Read (63), Kellogg (39))

8. The amount of differentiation created in children's drawings is related to their conceptual maturity. (Goodenough (34))

9. Drawing and painting tend to serve different purposes for the young child; the former being more appropriate for the expression of ideas, the latter more appropriate for the expression of feeling. (Alschuler and Hattwick (3))

10. The use of forms, color and composition is related to the child's personality and social development. (Alschuler and Hattwick (3))

11. Children living in different cultures create visual schemas having remarkable degrees of similarity especially at the preschool level. (Read (63))

12. The human figure is the most common subject-matter drawn by children of school age. (Barnes (6), Goodenough (34))

13. Young children tend to neglect the model in drawing even when it is placed in front of them. (Barnes (6))

14. Drawing development tends to be arrested around the period of adolescence. (Lowenfeld (50))

15. In the early stages of drawing development children tend to focus upon forms to be drawn individually without reference to the larger context of the picture plane. (Arnheim (5))

16. The development of skill in drawing can be influenced through instruction. (Dubin (30))

17. No important sex differences exist regarding the developmental stages in child art. (Lewis (45), Barnes (6))

18. Children tend to prefer art forms which are unambiguous in character and which are related to their stage of drawing development. (Lewis (46), Arnheim (5))

In addition to the conclusions concerning child art which appear contradictory in nature, there are a host of questions that may be raised about the course of its development. We do not as yet know whether the over-all rate of drawing development is constant or whether there are at different periods plateaus of spurts in rate of development. Nor de we know whether the various components of drawing such as use of color, line, composition, volume and spacial treatment develop at differing rates. The general and most pervasive assumption about child art is that it is a consequence of a natural unfolding of latent powers and should be left to develop at its own "natural" rate. Yet there is (30) some evidence secured through Dubin's work that developmental rate can be increased through instruction. The entire question of how instruction is related to drawing aptitude needs examination. Since scores of studies of learning have demonstrated the effect of the environment and of instruction on learning it does not seem unreasonable to expect that drawing ability is influenced by environmental conditions.

The variability found in child art at various grade levels needs to be assessed more thoroughly than it has been. In performance in reading it is known, for example, that the range in reading achievement in the average classroom approximates grade level (35); in the second grade there is a two year range of achievement, in the third grade, a three year range, in the fourth grade a four year range and so forth. Does the same general pattern exist for children's drawings? In the area of sex differences in drawings we have contradictory findings. Kerschensteiner's work (40) and that of Goodenough (34) indicate a sex advantage in favor of males. Yet Lewis' (45) research indicates no sex differences. This question needs to be answered especially with respect to the relationship between sex biased content and drawing characteristics. We need further to find out how much stability exists in children's art over short periods of time and of the conditions that effect shifts in level of performance. Several informal studies by my students indicate, for example, that role-playing used as a motivational device increases the ingenuity and expressive content of children's crayon drawings. If this finding is substantiated in future research it suggests that it might be fruitful to identify and test various modes of motivation regarding their impact on the form and content of child art.

The relationship between drawing and perception is especially interesting and important. It would be useful to know, for example, the extent to which drawing increases visual recall of the object drawn and whether drawing increases the individual's perception of the detail and over-all form of objects drawn. Perhaps by encouraging preschool children to view and draw with care a variety of objects set up in still-life fashion their general cognitive development could be increased. What consequences would ensue if over an extended period of time a group of children were allowed only to paint as compared to a group allowed only to draw. Arnheim has suggested that drawing activities facilitate perception since it allows the child to delineate forms more distinctly than does painting. (5) Such an observation, I believe, deserves to be tested.

These are only a few of the questions that can be raised about child art. The field is wide open for scores of interesting and potentially significant research studies.

The Theoretical Genesis of This Inquiry

In describing theories of child art and some of the more important research, I have attempted to highlight some of the major findings, positions and areas of disagreement. It is clear that there is much work to be done and that many of the questions concerning the development of child art, if adequately answered, can have important consequences for understanding cognition in general. Most of the theories that have been formulated have not been grounded in experimental data; some are couched in language that makes them unsusceptible even to objective description. Yet many of these same theories provide intriguing conjecture: Theories of the collective unconscious and of primordial images found in children's drawings exemplify interesting notions that might some day yield to empirical test.

But what of the conceptions underlying this study? What theoretical concerns provided the basis for this inquiry?

The primary motive for the present inquiry emanated from a practical need. This need was one of developing a scale that could be used objectively to assess what has been commonly called developmental stages in children's artistic development. Some of the questions that were raised in the previous section, it was thought, might be partially answered if such an instrument could be developed.

In addition to the desire to meet this practical need it was believed useful to examine the art products of two very different populations of students. Research on the culturally disadvantaged has proceeded with dispatch and excitement since the early 1960's. (13, 14, 61)
But the research that has been done has dealt primarily with cognition, language learning, perception and self concept and has not attended to drawing performance. (14)
I thought that it might prove useful and interesting to assess the drawing development of the culturally disadvantaged and to compare their performance to those of the culturally advantaged.

As I thought about the performance of populations so different in experience it occurred to me that the differences between the two populations in drawing might differ radically from those that have emerged in studies of verbal learning. Previous research on the cognitive development and school achievement of culturally disadvantaged and advantaged students has revealed not only that the advantaged are ahead of their disadvantaged contemporaries in measures of school readiness and achievement when they enter school, but that the disadvantaged group's cognitive deficit increases as it proceeds in school. (14,27) In short, the gap between the culturally advantaged and the culturally disadvantaged child gets larger with each succeeding school year. But while this might be true for verbal or symbolic activities and tasks it might not be the case when dealing with qualitative material. In England Bernstein (13) has found that children from the lower socio-economic classes learn a restricted linguistic coding system as compared to the elaborated coding system learned by children in the middle classes who typically come from homes in which parents have attained higher levels of schooling. The opportunity to acquire an elaborated system and thus to be better able to handle the more complex ideas mediated through such a system seemed to me to account for some of the difference between the two groups regarding school achievement.

But in the visual arts and in drawing specifically I reasoned that the culturally disadvantaged child was not as handicapped as he was in the discursive realm. Achievement in drawing, I reasoned, depends in part upon the development of perception and perceptual development occurs, in part, through the opportunities the child has to encounter and distinguish between qualitative phenomena.

In his essay on qualitative thought (28) written in 1931, and expanded thirteen years later in Art As Experience (29), Dewey distinguished between thought and intelligence which is primarily qualitative in character and thought which is primarily symbolic or discoursive. The former deals with the control and use of qualities such as line, color, tone, melody and so forth while the latter deals with material mediated through a symbol system. The ability that an individual has to perceive and control qualities intelligently is for Dewey a learned ability that is acquired through problem solving experience in the qualitative realm. The poet, the painter, the composer, the cook exemplify professions in which qualitative concerns are paramount and in which qualitative intelligence plays a significant role.

Since the ability to think intelligently about qualities is affected by experience with qualities, I reasoned that the disadvantaged child might not be handicapped since his environment is in many ways qualitatively richer than that of his advantaged counterpart. While the former's environment tends not to be as well organized, it does tend to be richer and more diverse in tactile, aromatic and visual phenomena. The streets of the slum and the "main drag" especially are often glowing with neon signs, filled with varieties of small shops and permeated by an audial presence that is much more apparent than the pristine quiet of the suburban street with its momotomous rows of tract houses and manicured greenery. In addition, the aromatic environment of the lower class home is frequently much more pungent than that of the middle class home where mamma buys deodorizers to neutralize the smell of cooked foods or other "foreign" aromas. All in all, I reasoned the material for perception and sensory stimulation in the lower class home exceeded what was available to the middle class child. And if the availability of these stimuli were necessary conditions for the development of qualitative awareness, and if qualitative awareness was a necessary condition for graphic delineation, then perhaps the drawings made by the disadvantaged children would be equal to or beyond the level achieved by children in the advantaged group. In addition, there was some evidence, provided in a study by Saltzman (69) that culturally disadvantaged children did better on the Draw A Man Test than on tests using verbal measures of intelligence.

Another theoretical concern associated with this study is that of determining the relationship between drawing stage and language development. The work of Mead (54), Sapir (70), Whorf (78), Carroll (18), Bernstein (13) and others has suggested that language not only serves as a primary means of communication among men but that the linguistic system that an individual learns serves to structure his perception and conception of the world. Linguistic concepts order experience, remind one of what to look for and call attention to those features of the environment that are salient in the system that one learns. In this sense one might say that we see the world, at least in part, through our concepts. The concepts and theories that we acquire in the course of being acculturated also provide a means for the storage and retrieval of data conceptualized through acquired linguistic systems. One of the most influential proponents of the view is Benjamin Lee Whorf and through his work we have what has been called the Whorfian hypothesis. Whorf writes:

> "The background linguistic system (in other words, the grammar) of each language is not merely a reproducing instrument for voicing ideas but rather is itself the shaper of ideas, the program and guide for the individual's mental activity, for his analysis of impressions, for his synthesis of his mental stock in trade. Formulation of ideas

> "is not an independent process, strictly rational in the old sense, but is part of a particular grammar and differs, from slightly to greatly, as between different grammars. We dissect nature along lines laid down by our native languages. The categories and types that we isolate from the world of phenomena we do not find there because they stare every observer in the face; on the contrary, the world is presented in a kaleidoscopic flux of impressions which has to be organized by our minds -- and this means largely by the linguistic systems in our minds. We cut nature up, organize it into concepts, and ascribe significances as we do, largely because we are parties to an agreement to organize it in this way -- an agreement that holds through our speech community and is codified in the patterns of our language. The agreement is, of course, an implicit and unstated one, BUT ITS TERMS ARE ABSOLUTELY OBLIGATORY; we cannot talk at all except by subscribing to the organization and classification of data which the agreement decrees." (18)

If it is true that language structures experience and provides for conceptual and perceptual differentiation and if it is also true that the ability to draw is related to the development of perceptual skills, then measures of linguistic development ought to be significantly related to perceptual development. Drawing development may be considered as being an index of perceptual development to some degree. Working with these assumptions I decided to assess the level of verbal learning in the populations studied and to try to determine what relationship, if any, existed between such measures and developmental level in drawing. If children who had high levels of verbal achievement also acheieved highly in drawing such evidence would lend additional support to the theoretical notions described above. If however perceptual development proceeded independently of linguistic development, if it depended primarily upon the opportunity to encounter rich qualitative phenomena and if such phenomena were in greater abundance in the slum than the suburb then one might expect only a slight relationship to exist between verbal achievement and drawing development. Through the planning stages of this study these notions, hunches and expectations became associated with the practical concern for developing an objective visual and verbal scale for assessing children's drawings.

Although any analysis of the act of drawing would reveal that perceptual processes play an important role -- even when naturalistic forms are not produced -- this same analysis would indicate that the development of perception does not tell the whole story regarding drawing performance. The sophisticated critic of music or art, the wine connoisseur, indeed critics in any field of activity need to be highly perceptually differentiated with respect to the subject-matter in which they have sophisticated critical skills. But the possession of critical ability in painting or drawing is not a sufficient condition for being able to draw or paint. The critic's achievement resides in adequate discourse about works of art; the artist's achievement is won in its production.

Similarly a child who is highly visually differentiated still needs to learn how to transform objects seen or imagined into the material with which he works. Arnheim, I believe, is quite correct in pointing out that this is both a difficult and creative task which is affected by the nature of the material the individual uses. (5)

It seems to me entirely appropriate to view the skills acquired in coping with such tasks as *technologies* through which the child transforms imagery and percepts into a public form. If one conceives of drawing performance as the result of utilizing drawing technologies, one is likely to place greater importance upon learning as a source of variation among children than if one views skills in drawing as being primarily a consequence of perceptual development, a development that unfolds through a genetic program. The former view emphasizes environmental conditions as a primary influence on a learned skill, the latter places considerably more importance on the realization of natural talents. The nativist would argue that the child develops primarily from the inside out; the environmentalist from the outside in. While both the nativist and the environmentalist have persuasive positions to argue, for the educator the genetic code for a particular child is a given; it is something which at this time cannot be understood, let alone altered. Moreover the practical difference between those who embrace nativism as compared to environmentalism primarily is one having profound consequences. My own disposition leads me towards a belief in the perfectability of man. And in this perfectability education and instruction specifically play a key role. The so-called stages of child art may be viewed not as natural stages through which a child passes -- something akin to adolescence -- but as manifestations of those graphic techniques the child has learned to use when coping with the problems of drawing. The shift from "stage" to "stage" may be considered as evidence of the change in use of drawing technologies. The extent to which these technologies can be changed through instruction is still unknown although there is some evidence by Dubin (30) and Zeittel (10) that rate of development in drawing and style of drawing can be altered.

The analysis of child art makes it possible to differentiate between two technological modes the child may employ in the act of drawing.

One technological mode I have called the *syntactical* and refers to the array of forms that are ordered on a ground as a spacial or aesthetic gestalt. A second technological mode I have called the *morphological* and refers to the way in which individual forms are structured independent of their spacial or aesthetic relationship to each other.

The syntactical technological mode has two aspects, one dealing with spacial syntax, the other with aesthetic syntax. Spacial syntax is evidenced in the way in which children attempt to establish ideational or perceptual relationships among the forms they construct. For example, a child who creates a base line and who subsequently places forms on that base-line is apparently attempting to provide a visual schema through which the individual forms can take on a desired spacial or ideational relationship with each other. The use of over-lap to create an appearance of depth is another technological device used by children to spacially order forms created on the paper on which they have worked.

At the pre-school level children tend to have little concern with the spacial syntax of their work. As Arnheim indicates (5) their solutions are local in character, they tend to confine their vision and graphic concerns locally, that is, to the particular form they work with at a particular time. In his first efforts at graphic activity the child seems to be guided by the visual stimulation he receives as markings are made on the paper and by the kinesthetic sensations derived from the activity of drawing itself. Even later, when the child reaches the kindergarten level there tends to be greater concern with the particular forms drawn than with their relationship to each other. Indeed one of the important technologies students of art need to learn is how to see the part as it relates to the whole of the work and how to employ techniques through which a cohesive unit can be constructed. For young children however the concern in drawing tends to focus upon the creation of forms which display at least a small degree of versimilitude with objects in the environment. Such concerns appear most important during the late pre-school and early primary school levels when children focus upon the construction of specific visual forms.

Aesthetic syntax deals not with the creation of space but with the organization of forms having a coherent formal relationship to other forms on the picture plane. Very young children often create paintings and drawings with highly sensitive aesthetic qualities but that these products are the result of learned technologies or controlled and thoughtful decision making is doubtful. Such works are more often than not the result of happy accidents in which the adult rather than the child recognizes and values the aesthetic result. Aesthetic syntax as a mode within the syntactical technology concerns itself with the extent to which aesthetic order has been conferred upon the forms created with respect to their visual interrelationships.

The morphological technology refers to the ways in which particular forms are created. These particular forms may deal with the total pattern or proportion of, for example, a human figure or with treatment of particular forms within that figure. A child may improve his technological ability to draw portraits, horses or airplanes and to some extent, claim Walter Sargent and Elizabeth Miller (71) such abilities are specific rather than general in character. This is especially evident in girls' drawings of horses and boys' drawings of fighter-planes. At a higher level of specificity, a child might advance in his ability to draw the curve of the nostrils as they lead into the upper lip. That mastery of such specific technologies is a concern of both children and those adults aspiring to become artists is attested to by the countless children who want to learn how to draw a head "correctly" and by aspiring art students who use the cues provided by anatomy books to improve their ability to draw highly specific parts of human anatomy. Figure 1 graphically identifies these technological modes.

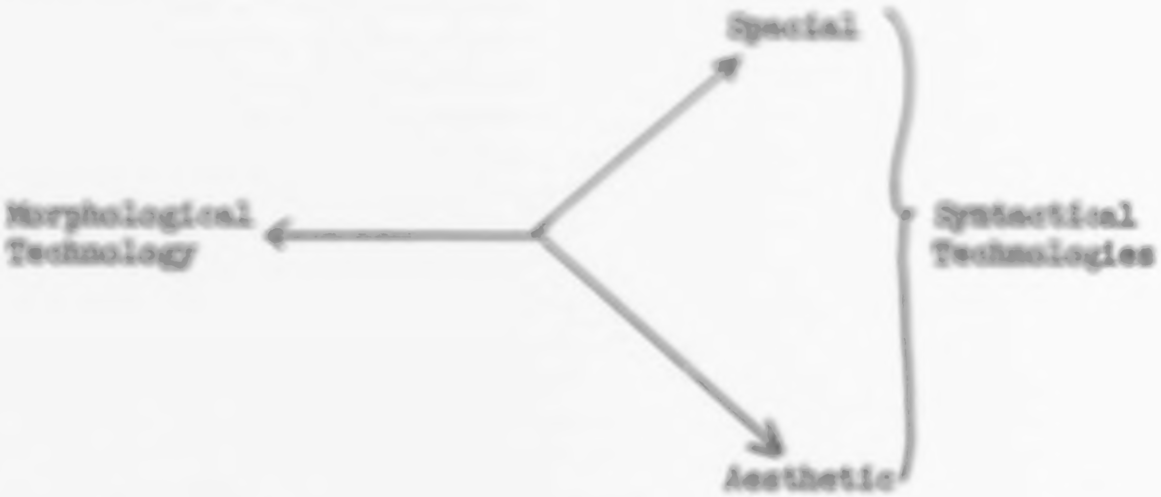

Figure 1
Technological Modes in Drawing

Here then are some of the theoretical issues that underlie the present inquiry. The need for a useful device through which children's drawings can be assessed is apparent to anyone familiar with the literature on child art. Greater understanding of the child's cognitive development, especially of the culturally disadvantaged, is a social as well as a theoretical goal of special importance today. The contributions of language to perception are an especially provocative area of study and one that has neglected the task of drawing as an index of perceptual development. It was around these general concerns and interest in formulating a useful scale that the study developed. And it is upon these concerns that it seeks to shed some light.

Procedures -- Selection of Populations

The populations for this study consisted of 1093 children in 46 classrooms selected from seven elementary and junior high schools in the midwest region of the United States. These children came from grades one, three, five and seven in schools located in an upper middle class suburb near Chicago and from slum or near-slum communities in and near Chicago.

The suburban school system from which approximately four hundred of the children were drawn has a median family income of about $11,000. Parents of the children in this community tend to be white collar workers and professionals -- the average socio-economic status index for this group on a decile scale is nine. The suburban community in which these children live is for the most part relatively new, having grown continually since the end of the second World War. The schools the children attend are also relatively new, having been built within the past fifteen years. Indeed the community prides itself on the excellence of its schools and pays its teachers on one of the highest salary schedules in the metropolitan Chicago area.

The children drawn from slum schools are almost all Negro children living in communities in the inner city and attending schools built around the turn of the century. The homes from which they come are physically depressed and often located in apartment buildings that have been subdivided to double the number of families that the building was originally intended to accommodate. Of the approximately seven hundred children from these communities about 30 per cent came from homes which received Aid to Dependent Children. The median socio-economic status index for the families of children in this group is two on a decile scale.

The principal of one of the schools that participated in the study has prepared a statement for faculty and parents which describes succinctly the school and some of its problems. He writes:

" FACTS ABOUT THE -- SCHOOL AND ITS COMMUNITY

There are at present fifty classes for pupils in grades 1B through 6A, eight Kindergarten sessions, four Educable Mentally Handicapped classes, two Trainable Mentally Handicapped classes and two Social Adjustment classes for boys. The current population of the school is 2100 pupils. The school was built in three sections during the years 1893, 1913, and 1924.

The community has changed in the past fifteen years from an all-white Jewish community to a Negro constituency. In 1948, the first year of the current administration, there were 1550 children and a staff of forty-four teachers and one secretary; the staff today numbers seventy-three teachers and two assistant principals and an office staff of three secretaries. Teachers' turnover has been extensive also, although we have slowed up considerably the past two years; median tenure of teachers is six years at present.

We do not like to accentuate the negative concerning our community, and yet the background of the children must be understood. In relation to family living -- 40% of the boys and girls in the school are living with their mothers only; income is often very inadequate to meet life's needs, yet drinking is heavy enough to support twenty taverns along one mile on the street on which the school is located; vandalism of property, and juvenile and adult crime are not uncommon."

One need not engage in elaborate measurement to recognize the differences between the two major environments used to select children for this study. Each exemplifies the stereotype of the slum and the suburb. The slum community is old, dirty, alive and over-crowded. Its children are ill-housed, ill-fed and poorly dressed. More than half will probably not finish high school. The children of the suburb walk to school amidst green lawns and tree-lined streets. Their homes are clean and neat and their clothes freshly laundered. These children do well in school and the majority will choose to enter college when their secondary education is completed. There is no social dynamite in suburbia; the poor and disenfranchised cannot afford to live there.

The selection of the populations was one of convenience in the sense that the schools and communities were near at hand and the teachers and principals willing to provide the time and effort to participate. In almost all cases the principal of the school was the first person to be contacted and this was followed by a meeting with him which permitted me to describe the study and the procedures to be employed. After this session I was, in each case, given permission to meet with teachers in the school in order to describe to them what was being undertaken and to enlist their support and cooperation. Those teachers who were interested in participating did so; those who chose not to (there were only a few who chose this option) were not invited to a subsequent meeting at which a further description of the study was provided and instructions regarding the procedures for securing drawings were presented and discussed.

At the second meeting with the teachers the theoretical issues underlying the study were explained and the rationale for the procedures to be used provided. I attempted to communicate to the teachers in a way that would enable them to understand the reasons for the procedures to be used; I did not want to have mechanistic operations performed by professionals who did not understand what they were doing. In general I believe the teachers understood the purposes and procedures of the research and their role in it.

The reason, of course, for selecting the four grade levels was to insure a developmental spread among the subjects. By selecting a cross-section of approximately three hundred students at four grade levels -- first, third, fifth and seventh -- I believed it would be possible to assess changes in drawing characteristics and still have a manageable number of subjects with which to work. By having about three hundred subjects at each grade level I would also have a sufficiently large number to use in analyzing differences by socio-economic status and grade as well as by socio-economic status, grade and sex. In order to insure that at least this number of subjects would be available at each grade level, approximately 1600 subjects were asked to provide drawings. Those subjects for whom, for one reason or another, complete data were unavailable were eliminated from the study and their drawings were used as material for training judges.

For each subject in the study the following data were collected:

1. Name
2. Age
3. Grade
4. School
5. Sex
6. Race
7. Teacher's Name
8. I.Q. Score
9. Occupation of Father or Breadwinner of Family
10. Gates Reading Vocabulary Score.

The teachers in each of the classes supplied these data from their records and when such data did not exist in the teacher's records it was secured from the school records.

After all school contacts had been made a total of seven schools representing six neighborhoods in two large cities and one suburb participated in the study. From these seven schools 46 classroom teachers chose to participate and from their classrooms 1608 students produced drawings while seven hundred provided both drawings and reading scores. The following chart presents a breakdown of the socio-economic status and race of the subjects as determined by those above and below the fifth decile on a population decile scale prepared by NORC. (66)

Grade S-E-S	1	3	5	7
Middle Class - White	64	99	92	110
Middle Class - Negro	38	39	51	14
Lower Class - White	39	33	23	42
Lower Class - Negro	328	331	260	45
			TOTAL	1608

Method Used to Secure Data

In order to obtain drawings made under similar, if not identical, circumstances it was decided to select a medium with which children had familiarity and a topic that would appeal to children from six to twelve years of age. The medium with which children were most familiar was colored crayons and its use, it was believed, would pose no serious problem in the classroom. Thus a new box of eight colored crayons was given to each child and a sheet of manila paper 12" x 18" was to be used for making the crayon drawings.

The use of crayons rather than paint tended to increase the likelihood that children would not have to grapple with the technical problems of controlling paint, ink or other types of fluid media. Yet because the box of crayons that was distributed was new the motivation level was considered likely to increase.

By keeping the theme constant across grade levels and by identifying a theme of playing on the school yard it seemed more likely to be able to obtain objectivity in judging and of reducing variability in the way in which the drawings were produced. To increase the likelihood of a common stimulus the teachers were given brief verbal instructions to be read or presented informally to the children. These instructions were as follows:

> "In a few minutes you will have a chance to make a crayon drawing and you will be given a brand new box of crayons to use. (The test administrator will show the crayons and paper to the subjects.) But before I give you these materials I want to tell you about what I would like you to draw.
>
> "All of you play with friends in the school yard before school or after school or at recess. I would like you to think now about the kind of things you do in the school yard. What kind of things do you do in the school yard? (The test administrator asks this question but does not wait for an answer.)
>
> "I would like you to make a crayon drawing of you and your friends playing in the school yard. You will have twenty minutes to complete your drawing." (The materials are then passed out and the subjects told to begin. If questions are asked by the subjects they are to be answered in such a way as to get them into the act of drawing with the crayons.)"

In discussions with the teachers the reasons for using these instructions were explained and the teachers were urged to present this material as they might present similar material in their classes. I wanted the children to assume the task with some degree of interest; I did not want a rote or mechanistic presentation that would dampen their motivation.

The teachers were instructed to provide additional sheets of paper to children who felt they had ruined their first sheet and who wanted another, but not to encourage such a practice. The teachers were also asked to provide sufficient time for the children to complete their drawings. Although this was not a speed test it was expected that children would complete their drawings within a twenty-minute period. By having the teacher introduce the task and distribute the materials I hoped to reduce the artificiality that might come from one who was unknown to the children. In short, every effort was made to create a situation in which the children would display an interested seriousness in the task at hand.

After each drawing was completed and collected it was assigned a code number representing the school and grade as well as the particular identification number assigned to each pupil. To insure anonymity any identifying information on either side of the drawing -- and there were a few drawings that had identifying marks -- was eliminated.

Since one aspect of the study was to secure data on the relationship between drawing development and language, a test of language usage was employed. The best single predictor of verbal learning, if one has to select only one index, is vocabulary development. To secure a measure of vocabulary the reading vocabulary subtest of the Gates Reading Test (33) was used. This subtest was administered to subjects in the fifth and seventh grades only since the test is recommended for use at the third grade level or above and because the reading competence of culturally disadvantaged third graders is too low to be measured reliably by the Gates Test. The reading vocabulary test was both administered and scored by the teachers using the standard instructions and scoring key provided in the test battery. The reading test was administered at least a day after the drawing task had been completed.

Methods Used to Construct the Scale

The preceding section has recounted the way in which the data used in this study were gathered. The job of constructing the scale has yet to be described. It is to this that we now turn.

From the literature on the developmental characteristics of child art six stages of child art were identified. Each of these stages was not only presented by writers with respect to its defining characteristics but also in terms of the order of its appearance. These six stages were used as a base from which several other "stages" or characteristics were identified. For example, although previous authors have described a stage in which drawn figures were placed upon a base line drawn near the bottom edge of the paper, no differentiation has been made between drawings in which the objects were "floating" above the base line as compared to those which stood upon it. Since there was no convincing reason to assume at the outset that these characteristics were developmentally the same, a separate category or stage was used to classify drawings having these characteristics. In a similar fashion other categories were formulated since I believed that it would be better to have highly differentiated categories initially since the categories could be collapsed later if that seemed desirable.

Preliminary analysis of existing categories and the formulation of other possible categories yielded a total of nine categories. These nine categories were then used to screen drawings on a preliminary basis to determine if the categories constituting the scale would include all of the 1608 drawings that had been collected. This preliminary review made it clear that four more categories would be needed since several dozen drawings could not be placed without ambiguity into the nine categories that had been formulated.

The procedure used for preliminary analysis of the drawings consisted of randomizing the order of all of the 1608 drawings that had been collected and with the assistance of a research assistant applying the categories to sort the drawings. This procedure was done in two ways. First, half of the drawings were sorted jointly and discussed if their categorization presented some difficulty. This procedure made it possible to clarify the criteria to be applied to the drawings and pointed out qualities in drawings that might otherwise have gove overlooked. Second, the other half of the drawings were judged independently to identify the extent to which the categories could be applied reliably. This process, one which was central to the construction of the scale, lasted for about a three week period. What I desired was not only a scale that could be applied reliably and with ease but one that was comprehensive in the sense that it could be applied to all or almost all of the drawings that had been collected. Even with as many as 13 categories it was found that a small percentage of drawings -- about five per cent -- could not for one reason or another be categorized. These drawings were assigned to category 14 -- a "clean up" category.

When this period of analysis and discussion had terminated fourteen categories had been formulated. For each category model drawings exemplifying each were selected and verbal criteria were formulated. Below are listed each of the fourteen categories used in the study and the verbal criteria accompanying them.

Category 1	No horizon line present. Morphemes "floating", not standing on the edge of the paper.
Category 2	Morphemes standing on the bottom-edge of the paper. No horizon line drawn.
Category 3	Some morphemes standing on the bottom-edge of the paper, others floating in space.
Category 4	Morphemes standing on bottom edge of paper and horizon line drawn.
Category 5	Partial horizon line drawn.
Category 6	Two or more horizon lines drawn.
Category 7	Horizon line drawn. Morphemes floating above horizon line.
Category 8	Horizon line drawn. Morphemes standing on horizon line.
Category 9	Horizon line drawn. Some morphemes standing on horizon line, other morphemes floating above horizon line.

(Continued)

Category 10	Morphemes overlap ground but do not overlap horizon line.
Category 11	Morphemes standing on bottom edge of paper and overlapping horizon line.
Category 12	Horizon line drawn. Morphemes clearly overlapping horizon line.
Category 13	Horizon line drawn. Morphemes overlapping each other.
Category 14 *	Unclassifiable.

Once having formulated or selected the various categories and criteria the problem turned to that of arranging them in some developmental order. This was done in part through the descriptions of their appropriate location chronologically by previous investigators and in part by judgments based upon my experience working with children in the field of art. If my judgments concerning the order of the categories were wrong, the empirical results would indicate this. If there were an order of development and if the categories reflected this order, statistical analysis would make this apparent.

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* Visual examples of each category are found in Figure 12. This Figure is the last page of this report.

Evaluation Procedures

While it was hoped that the application of the scale would not require a degree of training and experience in the field of child art that would render it impractical for general use, it was considered advisable that on its maiden voyage teachers of art apply it to the data that had been gathered. Two art teachers, one male and one female, were invited to participate in the study by serving as judges. Both had considerable experience as teachers of art in public schools and as artists. Although both teachers worked as art instructors in one particular school, this was a school that did not participate in the study.

These art teachers, who were compensated for their services, were told about the nature of the study and it was explained to them that their participation would have two parts. First, there would be a training period lasting about two hours per day for a three to six day period; second, they would rate all of the drawings independently using the scale that had been constructed.

In order to train the judges to use the scale those drawings made by subjects for which there was incomplete data were selected. In addition, where an over-abundance of drawings existed, as, for example, for lower-class first grade students, drawings to be used for training purposes were randomly selected. Approximately four hundred drawings were selected in this fashion and were randomly arranged in groups of fifty for use during the training period. By grouping the drawings in lots of fifty, it was possible to provide feedback at short intervals regarding the degree of consensus between judges. This procedure made it possible to clarify criteria and make more explicit their interpretation and application.

In training the judges five drawings exemplifying each of the fourteen categories were selected and taped to the walls of two rooms. These exemplary drawings provided visual criteria to be used to assign drawings to the fourteen categories. In addition, each judge was given a sheet that provided verbal criteria. After each judge sorted a group of fifty drawings individually he would meet with the other judge and my research assistant and me to review the assignments made, to note disagreements and to discuss the reasons for their assignments when they differed.

It is interesting to note that on the initial sorting of the first hundred drawings the judges agreed on 64 per cent of the assignments. During this training period there were a number of drawings which required much discussion regarding the category to which they should be assigned. Whenever possible the interpretation of the category and its application were clarified. In all, the training period lasted for two hours per day for a four day period.

The procedures used during the training period for evaluating drawings were the same as those used in the final evaluation with a few exceptions. Like the procedures used during training, model drawings were displayed on the walls of two rooms in which each of the judges worked. Under these drawings there were large long tables to receive the drawings assigned to a particular category. The judges worked independently judging about 150 drawings per day. Prior to providing a batch of drawings to a judge the drawings were randomly ordered. Thus in any group of drawings a judge received there might be drawings made by subjects in the first through seventh grade. The judges had no way of knowing who made the drawing or the school or grade level of the subject.

After a group of drawings had been categorized by a judge the drawings were gathered together and their assignment recorded. After this had been done they were again randomly ordered before being given to the other judge.

After both judges had completed assigning approximately 1100 drawings to the fourteen categories that constituted the scale, the ratings that were assigned by each were compared. Since no research study can be better than the instruments used to gather its data the degree of agreement among the judges was a crucial concern. The percentage of agreement between the two judges was .72, somewhat higher than the initial judging during the training period and clearly high enough to warrant confidence in the scale that had been constructed. It became apparent, however, during the course of the judging that fatigue and oversight might have entered into the judgmental process; hence it was considered desirable to extract the drawings on which the judges disagreed and to allow them to view these drawings jointly to see if their disagreement was a function of oversight or if it was due to a genuine difference of opinion regarding the category to which the drawing belonged. I did not want the judges to acquiesce to each other but I did want drawings that were placed in categories through error or for which certain aspects went overlooked to be identified and such error corrected. Each of the drawings which were assigned to a different category was selected from the total group of drawings and reviewed jointly by the judges to see if consensus could be reached. When this second judging procedure was completed approximately 98 per cent of the drawings had been categorized with unanimity. These drawings, those judged with unanimity on both independent and joint judging, provided the drawing data and therefore the subjects used in the study.

The Findings

The findings of this study will be presented in relation to a series of questions that are considered of primary importance. The findings will be presented first in relation to data for the entire population, a population with unequal numbers at each grade level, and then they will be presented for a randomly selected sample consisting of equal numbers of subjects for each of the two major socio-economic groups at each grade level.

1. To what extent could the scale be reliably applied to the drawings?

As already indicated, the value of an empirical study can be no greater than the reliability of the instruments used to assess its data. This study is no exception. To determine reliability -- or more specifically, inter-judge agreement -- three procedures were used. First, the overall percentage of agreement between the judges was calculated; second, the percentage of judge agreement was calculated for each category; finally, coefficients of correlation were computed between the categories assigned to the drawings by each judge.

Table II presents percentages of agreement between the judges after they had independently categorized each of 1109 drawings. From this table it can be seen that there was unanimity on 801 or 71.65 per cent of the 1109 drawings judged. Since there are fourteen categories in the scale, a random assignment by judges would yield agreement on 7.5 per cent of the drawings. Clearly inter-judge agreement was sufficiently high to warrant some confidence in its application.

Looking further at Table II we find that eighty-eight or 7.87 per cent of the drawings categorized differed by one category and that 5.19 per cent of the drawings differed by two categories. This suggests that approximately eighty-four per cent of the drawings could be objectively categorized independently with a relatively small degree of error or variation between judges.

In order to determine the relationship between categories to which drawings were assigned by each of the judges, Pearson correlation coefficients were computed on both independent judging and independent and joint judging combined. Table III presents these coefficients. For the former the coefficient of correlation is .80, for the latter .91. Both coefficients indicate high reliability among judges and both are significant at the .001 level of confidence as is .87.

Since one objective of the study was to construct a scale that was comprehensive, that is, one which would encompass a wide variety of types of drawings, it is important to determine the percentage of drawings to which the scale was applicable. We find that in its present form the scale was applicable to 95.6 per cent of the drawings that were made. This however needs to be qualified in the sense that this scale was applied to a set of drawings produced under particular circumstances by a specific population. It is reasonable to expect that a younger population, for example, or one that was asked to draw a different set phenomena from that elicited by the stimulus story might produce drawings requiring a different set of scaled categories. How different such categories might need to be remains to be seen. Nevertheless it seems reasonable to expect that some differences in drawing characteristics would be present.

The first task, that of constructing a scale by formulating verbal criteria and visual examples that could be applied reliably to children's drawings covering a six-year span, appears to have been completed with some degree of success. Once this task was completed it became possible to raise a host of questions about other types of relationships.

2. How were drawings distributed among each of the fourteen categories constituting the scale?

This question aims at determining the frequency with which drawings were assigned to each category. Were the drawings equally distributed among each of the categories or were some drawing technologies more frequently employed than others? Table IV presents the percentage of drawings assigned to each category for a population of 1093 subjects as well as by grade. From the figures presented in this table it can be seen that certain categories such as four, five, six, and ten account for five per cent or less of the drawings produced while other categories, namely one, eight, eleven and thirteen account for twenty per cent or more of the drawings in at least one of the four grade levels. This indicates that some of the drawing technologies are used only rarely by the subjects in this study. The extent to which experimental conditions can elicit drawings which display particular characteristics is as yet unknown. Such a problem is of no mean importance since it would, if successfully resolved, reveal the conditions that elicit the application or facilitate the learning of particular drawing technologies on the part of children.

3. To what extent do drawing scores increase with grade level?

Since the categories constituting the scale were arranged according to an order of performance which in my view was related to age and grade, it is important to analyze the data to determine the extent to which these judgments were warranted. If the drawings were ordered "correctly", mean drawing scores ought to increase with each succeeding grade. If the categories were ordered randomly, mean scores by grade should show no differences.

Table V presents means, standard deviations and F ratios for all subjects in each of the four grade levels. At the first grade the mean is 6.12, at the third grade level there is a slight increase to 6.69, but at the fifth and seventh grades the scores increase to 9.76 and 11.31 respectively. The F ratio is significant at the .001 level indicating a true increase in scores across grades. Figures 2 and 3 present these relationships graphically.

To determine if this increase is related to sex a similar analysis was performed for each sex. Tables VI and VII present these data. These data are remarkably similar to those for the total group as might be expected since each group contributes to about half of the scores in the total population. For each of the sexes mean scores increase significantly across grades. Figure 4 presents these relationships by sex for the total population.

Comparison of mean drawing scores is, however, only a gross index of the accuracy of the ordering of the categories that constitute the scale. A more precise index is the distribution of drawings by category for each grade level. Table IV presents these percentages and Figures 5, 6, 7, and 8. graphically present the percentage of drawings assigned to each category at each of the four grade levels by S.E.S. Aside from those categories to which only a very small percentage of drawings were assigned the distribution of drawings is in the predicted direction. The median number of drawings at grade one was located at category 6; at grade three the median is 7; at grade five, 10; and at grade seven, 11. Cumulative distributions by grade are presented in Table VIII. Clearly, as children mature they tend to employ those drawing technologies assigned to the upper end of the scale. Whether the use of such technologies results from a natural unfolding of skills lying latent within the child or a result of learning requires an experimental investigation. Evidence provided by other investigators (10, 30) suggests to me that the latter conclusion is more plausible than the former. Conclusive verification, however, requires experimental manipulation.

One of the interesting aspects of Tables VI and VII is found in the standard deviations for both males and females. In each case variability decreases as grade level increases. What is striking about this finding is that it is the opposite of what one would expect of performance in academic areas. In reading, mathematics or social studies variability tends to increase as children mature. (35, 23, 76) Differences in rate of learning spread children out, as it were, and providing for individual differences to accommodate learning rate becomes one of the major concerns and problems of many teachers. Indeed, it has been argued that the "good" school ought to maximize individual differences rather than minimize them. This can occur not only by differentiating the content to be encountered by children in school but by providing for different rates of learning in those content areas that are common to all students. The concept of continuous progress and the arguments of those supporting computer-assisted instruction rest heavily upon the belief that learning should be made efficient and that individualization should be provided. Such individualization would yield great variability in rate of what is learned as well in content to be learned. But even when there is little individualization in rate or content, variability in performance among children tends to increase as children mature. Why then should this not be the case in drawing performance? Why in this area should the standard deviation at the seventh grade be about half as large as it is at the first grade? One possible explanation is that the instrument used in this study was insensitive to the subtle variations that exist in the drawings that were made. Hence, although variability exists and increases over time with the instrument developed in this study judges were unable to recognize these variable qualities.

A second possible explanation is to argue that the instrument had a ceiling that was too low; consequently it did not identify the types of performance that "talented" children might display through their work. Yet the mean performance of the group even at the seventh grade level is about two categories below the ceiling of the scale. There was at least some additional room left on the scale for higher performance.

A third possible explanation is to argue that drawing performance is a developmental activity analogous to crawling or walking. While in these latter types of activities there is great variability at some age levels, for walking, for example, there is little variability among children past eighteen months of age. By the time children reach this age almost all -- with the exception of those who have some physical impairment -- are able to walk. Hence any measure of walking ability of children older than eighteen months would show little variability.

This line of reasoning would argue that the technology of over-lapping morphemes is one that develops during the natural course of maturation and that as children reach ten or twelve years of age they simply become able to employ this technology. Such a view is nativistic in character and accounts for reduced variability on the basis of the natural unfolding of human abilities along a developmental continuum.

A fourth possible explanation of the tendency toward reduced variability as children get older deals with the relationship between drawing performance and school learning. If we conceive of drawing, in part, as the exercise of morphological and syntactical technologies that are invented or in some other way learned by the child, then the relationship between opportunities for such learning or invention to occur and the levels of drawing performance among children becomes a crucial concern. The advanced technologies in drawing, those that provide the illusion of overlap, perspective, volume and foreshortening, are complex and difficult to acquire and employ. Learning to disregard what one knows the length of a human arm to be in order to render the illusion of a foreshortened arm on paper is an exceedingly difficult task requiring much concentration and instruction. The making of simple forms on paper however is easy, relative to overlap, perspective or foreshortening. In the course of their efforts to draw most individuals acquire and employ some of the simpler drawing technologies, although even such simple tasks for many people are encountered with difficulty. Thus it appears reasonable to assume that in the act of drawing there is a range of difficulty with respect to the technologies that may be employed. While almost anyone can make a scribble or draw a simple form of a house, few can render a perspective drawing of a city street.

If we turn now to an analysis of art instruction in elementary schools we find that while art is a part of the curriculum in most elementary schools, the art program for a class is generally under the direction of the classroom teacher. (59) Elementary classroom teachers typically have little competency in general art, let alone in drawing specifically. (59) Hence the art program tends to be superficial with respect to the development of drawing skills. The general tendency is toward exposure -- providing children with an opportunity to "experience" a wide variety of media. Since instruction in art and drawing in particular are not typically a part of the elementary school program, what a child learns in the domain of drawing is usually a result of his own efforts to draw at school or at home or an ancillary consequence of engaging in other types of activities. But since the higher levels of drawing performance require the exercise of complex skills, these skills are less likely to be acquired through invention or self-instruction. In the course of living, drawing and working with art media the child learns what he can but does not tend to master many of the complex skills. Hence as children mature they learn to use the simpler technologies and terminate their skill development in drawing without having acquired the more complex skills.

If children had instruction in drawing specifically it would be reasonable to expect variability in performance to behave in ways similar to variability patterns found in other areas. Since such instruction is generally absent the likelihood of achieving mastery of really complex drawing technologies is minimized.

An informal perusal of the 1600 drawings that were obtained provides considerable evidence that complex drawing skills were not employed by the children in this study. The drawings that were made, with few exceptions, give the impression that children had very few complex skills that they could employ in the production of a drawing. Evidence will be provided later that there was little indication that the children could consciously design the aesthetic syntax of their drawing and few had mastered spacial syntax regarding the use of perspective. The use of color or value to provide a sense of volume was virtually absent and foreshortening non-existent. In short, as one reviews the 1600 drawings secured initially one can hardly escape the conclusion that skill in drawing is not very highly developed.

4. Are there differences in the performance patterns of boys and girls?

Table IX presents means, standard deviations and t ratios between males and females at each of the four grade levels. It is clear from these data that the performance patterns for boys and girls do not differ significantly. Figure 4 presents these relationships graphically. This finding adds additional evidence to support research findings by Lewis (45) regarding the developmental patterns of space representation. In her study Lewis formulated three visual scales corresponding to three types of spatial representation: spherical space, cubic space and spatial depth. Twenty-seven intact classes of children enrolled in grades Kindergarten through eighth in five public schools were asked to make drawings of each type of space. Lewis found that relationships between drawings depicting space and grade level was strong, that children tended to prefer pictures in which the characteristics of objects were revealed with great clarity and that differences in performance patterns were non-existent.

In some ways it is surprising that no differences emerged between the sexes either in this study or in Lewis' study. Research I have undertaken on attitudes and information about art at the high school and college levels (31, 32) indicate repeatedly that girls have more favorable attitudes toward art than do boys and that they tend to have significantly more information about art. Differences in performance at these levels would lead one to expect differences at the elementary school level even though the product or behavior being assessed is different.

In retrospect, however, the finding appears reasonable. The task of drawing is sufficiently complex that even with a cultural bias toward the arts in favor of females over males, the technologies constituting the task would not be easily mastered without instruction. And since instruction in drawing is generally not provided, in school or at home, the cultural press for aesthetic values and information is not sufficiently strong to yield differences in drawing performance..

Other explanations are, of course, possible. It may be that cultural values toward the arts do not emerge for females until adolescence; hence, there may be no differences between boys and girls regarding aesthetic values at the elementary school level. This, however, is doubtful since a variety of studies and much theory concerning the acquisition of sex-role would indicate that many sex-associated values are learned well before adolescence. (51, 75)

Another possible explanation is to assume that although those characteristics which are associated with masculinity and femininity were present in the drawings they were not identified by the categories in the scale since these categories were not constructed to dientify sex differences. To determine differences between the drawing characteristics of boys and girls would require a much wider range of criteria than that provided by the scale used in the present study. Studies along such lines are waiting to be undertaken.

5. What differences, if any, exist between the drawings made by culturally disadvantaged as compared with children who are culturally advantaged?

This question was one of the most important raised in the study and provided the criteria for the selection of the populations. As you will recall, one group of children came from communities characterized by the amenities usually found in areas for the upper middle class. The culturally disadvantaged children came from slum or near-slum communities and of this group approximately thirty percent lived in homes receiving Aid to Dependent Children. You may remember further that I believed that while previous studies comparing the performance patterns of advantaged and disadvantaged children indicated an academic deficit that increases over the years for disadvantaged children, I expected that no similar gap would be found in performance in drawing. Stated briefly, the reasons for this belief were that I thought the disadvantaged child was not as handicapped in drawing as he was in the linguistic areas and that since drawing depended in part upon perceptual awareness of qualitative phenomenon and since I believed the qualitative environment of the slum was richer than the suburb, I reasoned that its availability to the slum child might even put him at an advantage.

Alas, the data do not turn out the way I conjectured. Table X compares means, standard deviations and t ratios for each of the two populations. The mean drawing score for children in the lower socio-economic group was about two and one-half categories below the advantaged group, a difference significant at the .01 level of confidence.

To determine whether such differences were present in more narrowly defined populations, analyses comparing scores by grade level for each population were made. Table XI presents these data. In each of the four grade levels culturally advantaged children reveal higher drawing scores based upon the categories to which the drawings were assigned than did their culturally disadvantaged contemporaries. Figures 9, 10 and 11 present these relationships graphically by S.E.S. and by S.E.S. and sex.

There are several striking features to the data presented in Table XI. For one, not only does the culturally advantaged group receive higher scores at each grade level but it takes children in the disadvantaged group until the fourth grade to perform at a level comparable to the advantaged group at the first grade. Children in the disadvantaged group received a mean score at the first grade of 5.56. Advantaged children at this grade level received a mean score of 7.69. At the third and fifth grade levels disadvantaged children received mean scores of 6.04 and 8.93 respectively. If we interpolate between these scores fourth grade disadvantaged children would receive a score that approximates the level of performance of culturally advantaged children at grade one.

Another interesting feature about these data as well as the data presented in Tables XII and XIII is the fact that the trend toward reduced variability as grade level increases appears again. It appears for the total population, for each of the sexes, and it appears for performance of children in each of the two major populations in the study. In drawing, as far as characteristics assessed by the scale used in this study, children tend to become more homogeneous as their age increases.

Perhaps the most significant and interesting feature of Table XI is the relationship of scores at each grade level between the populations. If one examines studies comparing the academic achievement of culturally advantaged and disadvantaged children over time, one finds that the gap between the groups increases the longer children remain in school --- the rich get richer and the poor get poorer. But when one examines the drawing data one finds that the gap between the groups does not widen at all. The two category difference in performance between the groups is sustained until about the seventh grade when it reduces to a difference of less than one. Again, why should differences between advantaged and disadvantaged groups grow wider with each successive year in the academic areas and why should such differences remain constant and eventually diminish at the seventh grade in drawing?

I believe this reversal to be a function of the fact that little or no provision is made in the school to develop drawing technologies so that the initial advantage that the culturally advantaged child has at the first grade is dissipated by the time he reaches the seventh grade. The culturally disadvantaged child catches up to his advantaged counterpart since with more time living and more opportunities to draw he learns to use the syntactical technologies that the culturally advantaged child learned far earlier.

6. What relationship exists between level of performance in drawing and reading vocabulary?

As indicated at the outset of this report, the relationship between language, perception and drawing was considered both of interest and importance. As you will recall it was argued that drawing requires the ability to perceive visual forms, and that while drawing ability was not considered wholly a function of visual differentiation, high level visual differentiation probably plays an important role in drawing. (5) It has been argued further by anthropologists (70), linguists (78) and psychologists (18) that language structures perception by providing individuals with the labels or categories through which perceptual content can be discriminated and encoded. Although this position has not been entirely verified in experimental terms, the argument is persuasive and there are a variety of studies which provide it with some support.

Given this view of the relationship between language and perception and the relationship between drawing and perception, the problem becomes interesting and complex. It has been demonstrated empirically that culturally advantaged children have larger vocabularies and more elaborated syntaxes than do children from culturally disadvantaged environments. (13) I have argued however that the perceptual content of the slum community is richer than that found in the environment of the upper class child. If this were true then we might expect a large positive relationship between social class score and reading score, a positive relationship between reading score and drawing score for upper class children and small relationship between drawing score and reading score for children in the lower half of the socio-economic range. Several types of analyses were performed in order to provide information relevant to these expectations. To these data we now turn.

Table XVI provides Pearson correlation coefficients for Gates Reading Vocabulary Scores and drawing scores for 421 subjects in grades five and seven combined. The coefficient of correlation, .44, is both significant and large and accounts for approximately 20 per cent of the variance. Given the fact that on the face of it reading vocabulary is not directly employed in the act of drawing, the size of the relationship between scores of drawing and reading is impressive.

When we look further we find that the correlations between reading score and drawing score are not the same for the fifth and seventh grades. Table XVIII provides Pearson correlation coefficients by grade. Here we find a considerably smaller relationship between drawing and reading vocabulary scores at the seventh grade -- which is .18, than at the fifth grade -- which is .47. The reason for the difference in the size of correlations appears to be explained by the variance of drawing scores at the fifth and seventh grades. For fifth grade children the standard deviation of drawing scores is 3.65, while for seventh grade children it is 2.28. Given the strikingly smaller variance at the seventh grade it is reasonable to expect that the size of the coefficient of correlation would be smaller.

Although the Pearson product moment coefficient of correlation provides one index of relationships existing among a pair of variables another analysis was performed to determine if there were differences between drawing scores for groups that differed radically in reading performance. Table XIX presents data comparing mean drawing scores for subjects in the upper and lower half of the population in reading vocabulary at the fifth grade level. The difference in favor of subjects in the upper half of the population is significant at the .01 level of confidence.

The same analysis was performed for subjects at the seventh grade. Here the differences are not so striking. While at the fifth grade level the difference between the groups in drawing is two and a half categories, at the seventh grade the difference is less than one. Thus the lower correlation at the seventh grade is probably not only a function of reduced variability but also a function of the small real differences in drawing performance for advantaged and disadvantaged groups.

These data indicate that while there is a strong relationship between drawing performance and reading vocabulary scores at the fifth grade level the relationship diminishes considerably at the seventh grade. Furthermore, while able readers receive significantly higher drawing scores at the fifth grade, able readers receive only slightly higher drawing scores at the seventh grade. Accounting for this phenomena is tricky. The ability to read is clearly associated with socio-economic status and socio-economic status is associated with a host of factors which appear to be related to drawing ability, especially at the first, third and fifth grades.

I believe the small relationship between drawing and reading vocabulary at the seventh grade to be due to reduced variability at this grade and I believe reduced variability to be due to lack of instruction in drawing. With lack of instruction on a potentially complex task children reach their "ceiling" at about age twelve; hence advances in reading -- which only in part is a perceptual activity -- can no longer be statistically associated since development on this task tends to be arrested.

7. What relationships exist between general intellectual ability as measured by I.Q. and drawing achievement?

A second measure that was employed to determine the contributions of "cognitive" development to drawing was intelligence as measured by I.Q. tests. In order to secure these data school records were examined and where test scores were available for the subjects they were recorded and transformed to Stanford-Binet equivalents. For a total population of 1108 subjects, 759 had such scores available. It should be emphasized that 1) no effort was made to determine whether these scores were representative of the total population and 2) that the period at which the I.Q. tests had been administered differed among schools. These two conditions are possible sources of error.

Table XXI presents coefficients of correlation for the population for whom test scores were available. The coefficient for the total population is .34. This coefficient is significant for an N of 759 at the .001 level of confidence. Clearly and not surprisingly "cognitive" development plays some significant role in drawing development as measured by the scale. But since I.Q. scores represent a ratio between mental and chronological age the large variability in drawing existing over the course of six grade levels tends to yield a small coefficient when it is correlated with a ratio score provided by the I.Q. ratio.

To provide for this situation coefficients of correlation were calculated between drawing and I.Q. scores at each grade. These coefficients are also found in Table XXI and are about the same magnitude as for the total group. One might expect therefore that a truer coefficient for the total population between drawing and mental ability would be considerably higher than that found between drawing and I.Q. for the total population.

These data provide additional support to Goodenough and Harris' claim that drawings reflect, in part, an important index of the intellectual maturity the child has attained. The Draw A Man Test yields coefficients between .4 and .8 for Draw A Man scores and I.Q. What this suggests is that in the production of spacial syntax as well as in the production of detail in the human figure the general cognitive development of the child plays an important role. General cognitive development is not likely to lead to more highly developed drawings with respect to spacial or aesthetic syntax without specific types of instruction occurring. Thus, it appears that the course of development in children's drawing is a function of the development of cognition generally and that it is the development of this congition that makes possible the acquisition of drawing technologies at least at the more simple levels.

In addition to the assessment of spacial syntax displayed in the drawings used in this study another type of assessment was attempted -- that of the aesthetic syntax of the drawings produced by the population as a whole, by each of the two socio-economic groups and by socio-economic group and sex. You may remember that in the scheme used to describe the conceptual underpinning of this study two types of syntax were identified. Spacial syntax deals with the creation of spacial illusion through the use of drawing technologies that the child learns to employ as he matures. Aesthetic syntax deals with the sense of "rightness", closure and goodness of formal relationships among the morphemes drawn. One of the tasks undertaken in this study was that of assessing the aesthetic quality of the drawings that were collected.

The assessment of aesthetic quality is a task that is difficult for many reasons: One, the judges may have different notions of what constitutes aesthetic quality; two, the differences between good and poor aesthetic quality can be quite subtle.

Because I did not want to prescribe a model to which drawings needed to conform in order to display different qualities of aesthetic goodness, a global judgment was made by two judges, both of whom had experience working with children's art. These judges were not the same as those who judged spacial syntax. Their task was to independently assign the drawings to one of five categories depending upon their judgment of its aesthetic quality. No effort was made to prescribe criteria other than that drawings high in aesthetic quality would display a concern for over-all composition while drawings at the other end of the scale would display "local solutions" to the drawing of objects; there would be little evidence of objects related to each other with respect to aesthetic considerations.

To judge these drawings in a way that would be independent of spacial syntax the drawings were randomly ordered within each of the spacial categories to which they had been previously assigned. When this grouping had been completed the judges were asked to proceed independently with their aesthetic ratings. Thus the drawings were judged in relation to the drawings within each spacial category.

One of the first questions that can be raised about this procedure deals with the reliability of the judgments. Table XXII presents coefficients of correlations between judges in each category and for the total population. Clearly the coefficients are statistically significant but just as clearly they tend, on the average, to account for about twenty-five per cent of the variance. Thus seventy-five per cent of the variance between judges is unaccounted for. Now the question turns on how high a coefficient of correlation needs to be if it is to be significant in other than statistical terms. This question can be answered only in relation to the function the data are to serve. When one is judging subtle qualities smaller coefficients might be "more significant" than large correlations achieved by identifying more obvious qualities. What these coefficients suggest to me is that moderate agreement on a quality that is difficult to objectify had been achieved.

In reviewing these coefficients I also wanted to know whather the judges were using different scales in their assessments. Tables XXIII and XXIV present means and standard deviations for each judge for the total population and for each of the categories. These coefficients are remarkably similar indicating that judges tended to use almost the same scale in rating the drawings for aesthetic quality.

Given the statistically moderate correlations between judges ratings the likelihood of finding differences in aesthetic performance between groups within the population is reduced considerably. Nevertheless several analyses were made to check these differences out. To do this the aesthetic syntax scores assigned by each judge were summed. In view of the similarity between means and standard deviations of each judge no effort was made to standardize raw scores before computing this total. The findings on the assessment of aesthetic syntax will follow the format used in reporting findings on spacial syntax.

8. Is there a difference between the aesthetic quality of drawings produced by students in the upper and lower half of the socio-economic continuum?

To answer this question mean aesthetic syntax scores were compared for the total group and for each of the categories. Tables XXV and XXVI present these data. From Table it can be seen that the difference between the lower and upper socio-economic groups approaches significance. At the .05 level of probability a "t" value of 1.645 would be required. What this indicates to me is not that the difference approaches significance but rather that the groups are so similar. The task of creating aesthetic order in drawing is apparently difficult enough so that even the culturally advantaged child in this area is not greatly advantaged as compared to his disadvantaged contemporary.

When we examine Table XXVI we find essentially the same relationships. Table XXVI presents "t" ratios comparing upper and lower socio-economic groups by category. In no category is there a significant difference between the means of the group.

9. Is there a difference between the aesthetic quality of drawings produced by males and females?

As you may remember no differences were found between the spacial syntax scores of males and females in the data previously reported. But what is the case with respect to aesthetic syntax? In Table XXVII we find that the girls received a mean score that is significantly lower than that received by the boys. What this means outside of the straightforward assertion that the difference is statistically significant in favor of boys is difficult to say. I would have expected the difference to favor the girls. This comes therefore as somewhat of a surprise. It should be pointed out however that although the difference is significant statistically whether it is practically different is another question. What we have is a difference of .44 points in favor of the males on a scale from 2 to 10. (The original scale the judges used was from 1 to 5. This score doubled yields a possible range of from 2 to 10.) This degree of difference between the two groups does not seem large enough to me to have practical import.

10. Is there a difference between aesthetic scores for males and females between each socio-economic group?

Table XXVIII presents data comparing the aesthetic performance of males and females between each socio-economic group. Here the findings are straightforward. In no case were performance patterns different.

What types of general conclusions can be drawn about the data dealing with the assessment of aesthetic syntax? For one, it is clear that the degree of inter-judge reliability achieved was considerably lower than that achieved in the assessment of spacial syntax. With lower inter-judge reliability the likelihood of discovering performance patterns between groups within the total population is diminished. What did emerge between groups as a result of subsequent analyses was a significantly greater mean in performance on aesthetic syntax for males than for females in the population as a whole, but although the difference was statistically significant it is sufficiently small to suggest that it has little if any practical significance.

In none of other comparisons between means by socio-economic status, sex and category did differences between the populations emerge. This suggests to me that we have at least one domain of activity in school in which differences between the performance pattern of advantaged and disadvantaged children are negligible. It suggests further that little appears to be done in school to enable children to acquire those drawing technologies that will enable them to cope intelligently and systematically with the control of aesthetic syntax in their own work in art.

Up to this point in the report the findings have been presented with respect to the performance of all subjects for whom drawing scores were available. This practice provided scores for unequal numbers of subjects at each grade and social class. As a check on the data a randomly selected sample at each grade for subjects in the upper and lower half of the socio-economic continuum were selected. By analyzing the performance of these groups it is possible to determine whether scores in the previous tables were affected by cells of unequal numbers of subjects.

To obtain these data sixty-two subjects in the upper and lower half of the socio-economic continuum were selected at each grade level. Table XXIX presents mean drawing scores for this sample for the total group and by grade. The performance patterns for this group as represented by means and standard deviations for each grade are comparable to those presented by grade for the total population presented in Table V. Like the larger population variance of scores diminishes as grade level increases. And like the performance at each grade mean scores increase with each succeeding grade.

Table XXX presents mean scores by grade for each of the two socio-economic groups. Here we find, like the data presented in Table XI, large differences in drawing performance between the two groups. One significant difference between the data presented in Table XXX and Table XI is that the lower socio-economic group received consistently lower scores in the randomly selected group than did the total population of lower socio-economic subjects. The general relationships within this group and between this group and the upper socio-economic group remain about the same however.

Table XXXI presents drawing scores by sex and socio-economic group for each grade. Again no differences between the sexes emerge for either of the groups. Although there is not a comparable table for the larger population, the findings presented in Table IX indicate no differences between the sexes for the total population.

Table XXXII presents coefficients of correlation between drawing scores and reading scores for 124 randomly selected subjects in each socio-economic group at grades five and seven. In the randomly selected group at grade five the coefficient is .53; for the total group as presented in Table XVIII it is .47, clearly not significantly different. At grade seven for the randomly selected group the coefficient is .26; for the total group it is .18, again near the same magnitude. For the total population of fifth and seventh graders combined the coefficient is .44, for the randomly selected group the coefficient is .52.

What we find then on questions of importance for this study is a strikingly comparable picture for subjects in the total group to those randomly selected from those groups. It would have been surprising if these findings had been different since the data were randomly selected from the larger group.

Conclusions

At the conclusion of a piece of research one can rightfully ask not only what conclusions of importance have been reached but what questions have arisen that suggest further research. In this concluding section we will examine both of these areas.

Perhaps the most important contribution of this study is the fact that a visual and verbal scale has been designed that can be applied with some degree of confidence in classifying the spacial characteristics found in children's drawings. In addition, types of spacial treatment that had not been discussed in the literature of art education have been identified. Whether these new types of spacial treatment are simply a consequence of the particular stimuli that were provided the subjects of this study or a pervasive type of treatment of space remains to be seen. To resolve this problem would require analyzing drawings collected under varying conditions. This might make it possible to determine whether or not the type of spacial treatment a child uses in his drawing is a function of the particular situation in which he works.

Even though this question has not been answered by this study, the study did demonstrate that even with as many as 13 types of spacial treatment identified, judges working independently were able to classify drawings reliably and that the order that was used among categories was in general an accurate prediction of the pattern of change among drawing technologies.

A second finding that appears of importance to me is the relationship of performance between boys and girls. Although I had expected to find performance differences in drawing as I had found in my work on the information and attitudes toward art displayed by students at the high school and college levels (31,32), no differences between the sexes emerged. This emphasizes for me the complexity of the act of drawing and suggests that sex bias tends to have relatively little effect on the execution of complex drawing skills when these skills are not developed through instruction.

One of the most interesting findings of the study is the reduction of variability at successive grade levels. What is of interest here is the fact that this is contrary to what happens to variability in academic realms. (35, 76) I suppose one could claim that reduced variability is evidence of the scarcity of artistic talent and the presence of rather low artistic ceilings for most people. This argument would proceed to indicate that since most people have low level artistic capacities these capacities are reached early in life and since only a gifted few are artistically talented, their performance levels do not do much to affect the mean or variance of a group.

It seems to me more reasonable to assume that reduced variability in drawing as children mature is a function of the lack of instruction in this domain of human activity. If one were to assess competency in bicycle riding of those individuals who had an opportunity to learn one would find, I suspect, at age twelve relatively little variability. Yet the potential for exercising high level skill in this area of human performance is well beyond the level of that typically achieved by "average" children. Indeed, why should high level skills in any area of human performance be expected without the instruction of others or through self-instruction? When there is a need to develop such skills, when -- for example -- the availability of skills affect survival, they are developed. When skills developed at a modest level are adequate, there is no need to develop them further.

Another finding of this study that appears both interesting and significant is the relationship among patterns of performance between culturally advantaged and culturally disadvantaged children. Despite my expectations children from culturally disadvantaged communities employ simpler drawing technologies at the first, third and fifth grade level than do children from culturally advantaged communities. What is intriguing about the pattern of technologies over the course of the six-year period is the fact that the gap between these two groups reduces each succeeding year. Again, this is contrary to what performance patterns for these groups look like in the academic areas. The culturally disadvantaged group, on the average, does not use the same drawing technology that the advantaged group used at the first grade until the group is in the fourth grade. In other words, it takes four years for the disadvantaged group to perform at a level that approaches culturally advantaged first graders.

This, it seems to me, highlights the importance and function of general cognitive development in the act of drawing. As Goodenough and Harris have argued and demonstrated, general cognitive abilities are part and parcel of drawing development and since they are, drawing development provides one index of cognitive development. (34) In so far as culturally disadvantaged children do not receive the type of parental tutoring frequently provided by parents of middle class children, they tend not to develop as readily or as rapidly the types of discrimination useful for school learning, one part of which is artistic learning. Middle class parents might be more anxious about school success for their child than are lower class parents and probably provide more space, materials and instruction for the development of skills useful in school. Even where there is a high need for school achievement on the part of parents in disadvantaged communities those parents themselves are often disadvantaged educationally and hence find it difficult to be of assistance to their children with respect to fostering school-related skills. Thus what is apparently required to develop skill in drawing is affected by the factors constituting the child's general environment at home and in his community. If this were not the case, if drawing skills were wholly independent of such factors, we would expect no significant relationship to exist between drawing scores and reading or I.Q. scores. In both cases, however, the relationships are both significant and large.

Although the development and utilization of general cognitive abilities appear to play an important role in drawing this does not indicate that development through instruction in drawing will facilitate the growth of general cognition. Even though the thesis that it would has been advanced forcefully by two of the major writers in the field of art education, Herbert Read (63, 64) and Viktor Lowenfeld (48, 50), empirical data to support this thesis is at present unavailable. If the thesis is true then a case can be made for art education not only on consummatory grounds, grounds which argue the importance of aesthetic satisfaction in its own right, but on instrumental grounds as well. Whether instruction and learning in art develops cognitive abilities useful in other disciplines has not as yet been determined. I for one, at this time, am not prepared to say that it does.

In the assessment of aesthetic syntax two general conclusions can be drawn. For one, the assessment of aesthetic quality in the drawings was far less reliable than the level of reliability achieved in the assessment of spacial syntax. Second, the differences that exist between the advantaged and disadvantaged group in the treatment of space do not seem to be paralleled by their performance in conferring aesthetic qualities to their drawings. In this area of performance the only difference that emerged was between males and females in favor of males. And in the comparison of means the difference although approaching significance was small. The most striking feature in this area of performance is the similarity between the groups.

The significance of a research study is as much a function of its ability to open up new questions for further inquiry as it is a function of its ability to resolve the problems to which it addressed itself initially. There are several questions that have emerged from this study, some of which warrant further investigation. One such question deals with the problem of determining the stability of the drawing technologies employed by children of various age levels. In the present study only one piece of drawing data was secured. This made it impossible to determine whether the drawing technology empllyed represents the typical mode of drawing technology that the child uses.

We do not as yet know the extent to which drawing technologies change during brief periods of time.-- perhaps shifts in technology do not occur to any significant degree, whether some drawing technologies are less stable than others or whether rate of change in drawing technology, if it does occur, is related to chronological age.

Further we do not know whether the stimulus conditions that are provided children affect the type of drawing technology they employ. Although as early as 1902 Barnes demonstrated the tendency of five and six year old children to disregard models when drawing even when they are placed before them, we have scant data dealing with the effects of different types of stimuli on the types of drawings that are produced. At least three types of stimulus conditions can be identified for experimental purposes. First, it would be possible simply to employ the conditions used in this study, that of visual recall of common experience. Second, it would be possible to prepare a still life set-up, that is to provide a visual display that would be used by children as a model for their drawings.

Third, it would be possible to create an emotionally powerful imaginative situation from which children could draw upon in their work. Would drawing technologies differ if each of these conditions were employed? In other terms, how does the motivational or stimulus condition affect the spacial syntax of children's drawings?

Related to these questions is the problem of determining the extent to which children can learn sophisticated and complex technologies in relatively brief periods of time -- say over the course of two or three months. Can children of age five to seven learn to employ overlap, volume and foreshortening in their drawings? Do such abilities alter their self concept in art? Do children who have such technologies available to them have greater opportunity to produce "creative" art products? Since the most vociferous advocates of laissez-faire instruction have argued that instruction in art hampers the child's creativity and self-fulfillment this assertion, it seems to me, can and ought to be subjected to empirical study. One could argue just as cogently that by helping children acquire the skills necessary for graphic control the likelihood of their producing products having creative characteristics is increased. One could argue further that there is no such thing as freedom without discipline and that the same relationship holds between discipline and creativity. These positions and the practices to which they lead should not, I think, be resolved on rhetorical grounds but on experimental evidence insofar as such evidence is possible to obtain.

Another question suggested by the study deals with studies of technologies employed developmentally by children on other aspects of the art product such as color, proportion, texture, detail and other formal aspects of visual art. The focus of this study was on spacial syntax. What is the developmental picture like with respect to the use of color or to the proportion of individual morphemes? It seems entirely within the realm of possibility to be able to formulate scales useful for describing technologies employed in several realms of the visual art product. The utilization of such scales would yield a much more comprehensive developmental profile of child art than we now possess. Lowenfeld made a major contribution to the field of art education by suggesting some of the relevant dimensions. (50) We need now to systematically develop and employ scales tapping some of the dimensions he identified.

One of the findings that emerged both in this study and in one reported by Lewis (45) is the lack of difference in the developmental pattern of performance in drawing by boys and girls. In view of the fact that it has been demonstrated by previous research that females place higher value on aesthetic matters than males and that they have more positive attitudes toward art than males as well as more art information (31) it suggests the problem of determining whether this attitude prevails at the elementary grades as well as at the high school and college. If even at the elementary school level girls place higher value on aesthetic matters than boys, the lack of difference between drawing performance would underscore the importance of skill acquisition and cognitive complexity required in the drawing act.

Summary

This study has attempted to formulate a scale that would be useful for objectively assessing the changing characteristics found in children's drawings. Although a large body of literature has been prepared on the developmental stages of child art, (3, 5, 19, 30, 50) few investigators have attempted to formulate procedures through which those characteristics could be assessed. Without a scale useful for making objective descriptions of these changing characteristics a basic body of reliable data in this area cannot be provided. Without such a scale it is not possible to determine whether the pattern of development in children's drawing changes over time; what degree of variability in drawing exists at various age levels; whether children of different backgrounds develop in drawing at different rates; whether drawing, especially as it pertains to spacial treatment, is related to intelligence; whether developmental patterns are primarily a function of general development or of specific types of learning. These and other questions require a scale useful for assessing child art objectively if they are to be answered. The primary objective of this study was to develop such a scale.

In addition to this major objective the study sought to determine the relationship between the pattern of development in drawing of two radically different groups of children. One group came from upper middle class families living in neat, clean and expensive homes in a well-to-do suburb; the other group came from poor Negro slum communities located near the core of two urban centers. Interest in these two groups emanated from both an immediately practical social need, that of finding out more about the performance patterns of culturally disadvantaged children in the hope that such knowledge may be employed usefully in their behalf, and from a theoretical interest in the relationship between environmental conditions, perception and the act of drawing. It was assumed that the qualities available to individuals living in a slum area were more diverse and imposing than the qualities permeating the environment of the upper-middle class suburban child. Given this assumption I speculated that the perceptual abilities of children living in slums might be more highly developed with respect to visual, tactile and aromatic qualities than those of his middle class contemporaries and since perceptual ability is related to drawing ability I speculated further that in the area of drawing children from the slum might not be as disadvantaged as they are in the discursive academic areas.

To determine the relationship between perception as manifested through drawing and language, performance in drawing was compared to performance on the reading vocabulary sub-test of the Gates Reading Test. (33) It has been argued by Whorf and others that discursive language functions as a perceptual mediator. The examination of the relationship between drawing and vocabulary was aimed at providing additional evidence in this area.

To deal with these questions and issues a scale consisting of fourteen visual examples of spacial treatment or, as it has been called in the study, spacial syntax, were formulated. In addition, verbal criteria to accompany each visual example were prepared. To secure drawings representing a developmental range of seven years approximately 1600 subjects in grades one, three, five and seven were asked to produce drawings made under similar conditions. To make these drawings a stimulus story was prepared, new boxes of colored crayons provided and paper 12" x 18" was distributed by the teacher to the children, half of whom were considered culturally disadvantaged.

In addition to the drawings, a reading vocabulary test was administered, I.Q. scores were recorded and socio-economic status determined for each subject.

Approximately 1100 subjects of the initial 1600 constituted the populations that were studied.

Several significant findings have emerged from this investigation. Perhaps the most important deals with the applicability and reliability of the scale since without reliability no further findings would be possible. To determine the extent to which the scale could be applied objectively two judges, both of whom were elementary art teachers, were asked to independently and then jointly sort the 1100 drawings into the fourteen categories that had been formulated. Two questions here are crucial: to what extent could the judges independently agree on their respective ratings and what percentage of the drawings could be classified by the scale.

It was found that the judges were able to agree independently on 72 per cent of the 1100 drawings categorized with unanimity. Since with fourteen categories a random assignment would yield an agreement of 7.5 per cent, it is clear that the percentage of agreement is high enough to warrant confidence in the scale and its application. But because it became apparent during the course of the judging that fatigue and oversight enter into the process of judging 1100 drawings and therefore provide an extraneous source of error, the drawings on which there was disagreement were identified and judged jointly to determine if consensus could be reached. Using this procedure agreement was achieved on about 98 per cent of the drawings. These drawings -- those judged both independently and jointly -- were used as the data for further analyses.

Regarding the comprehensibility of the scale -- the percentage of drawings to which the scale could be applied -- it was found that thirteen of the fourteen categories could be applied to about 95 per cent of the drawings. In other words, for the drawings collected from the populations used in this study and for drawings made under the conditions employed the scope of the scale was wide enough to be considered comprehensive.

Once the reliability of the scale had been determined and found adequate it became possible to raise a host of other questions pertinent to the issues and problems that motivated the study. One such problem was that of determining the pattern of performance for subjects at the first, third, fifth and seventh grades. Perhaps the most striking finding deals not with the increase in mean scores over these four grade levels -- that was to be expected -- but in the decrease in variability as grade level increases. What is striking is the fact that this is just the opposite of what happens to variability in other areas of academic performance. (35, 23) In reading, mathematics, science and the social studies variability tends to increase as children mature. In drawing, as measured by this scale, it decreases.

Comparisons of performance were made by sex as well as between each of the two socio-economic groups. Unlike the performance patterns of high school and college students on measures of information and attitudes towards art no differences were found between the mean scores of boys and girls at any grade level in drawing. This finding is consistent with Barnes' (6) early research conclusions and those arrived at more recently by Lewis. (45)

Regarding the performance patterns of the two major socio-economic groups an interesting and significant finding emerged. Although it was anticipated that the culturally disadvantaged child might not be as disadvantaged in the qualitative domain of drawing as he is in the symbolic domains of most academic disciplines, it was found that the culturally disadvantaged were at their greatest handicap at the first grade level and that it was only at the fourth grade that they were able to perform at a level comparable to the advantaged group at the first grade. But what is most striking is the fact that over time, unlike the increased deficit which occurs in the discursive academic areas, the culturally disadvantaged slowly begin to reduce the gap between themselves and their more advantaged comtemporaries. This reduction in difference continues to occur until by the time the groups are at the seventh grade differences between them diminish considerably.

To determine the extent to which reading vocabulary as an index of linguistic skill generally was related to perception as manifested in drawing, scores on the reading vocabulary sub-test of the Gates Reading Vocabulary Test were correlated with drawing scores. In this analysis of the data, an analysis performed only for fifth and seventh grade students, it was found that a significant positive correlation existed between drawing and reading vocabulary scores at both the fifth and seventh grade levels. The coefficient at the fifth grade level is .47, not only significant but substantial. At the seventh grade level the coefficient is also significant but small, .18. The smaller coefficient at the seventh grade appears to be accounted for by the relatively small amount of variance in drawing scores at this grade. For both grades the coefficient is .44, indicating a sizeable relationship between performance in drawing and reading vocabulary.

A second analysis of the relationship between drawing and reading vocabulary scores was performed by identifying students in the upper and lower half of the population on reading scores and then comparing their drawing scores. A significant difference between these groups was found at the fifth but not at the seventh grades.

In addition to the major variables of reading and drawing scores, I.Q. scores were obtained from the school records when they were available. These scores, after they had been transformed to Stanford-Binet equivalents, were then used as correlates with drawing scores. For a population of about 750 subjects the coefficient of correlation between drawing and I.Q. scores is .34, a coefficient significant at the .001 level of confidence.

In addition the the assessment of spacial syntax aesthetic syntax was also rated by two judges working independently and using a five point scale. In this assessment the drawings were ordered randomly within each of the spacial categories to which they had been assigned previously. Using a global judgment the over-all coefficient of correlation between judges was .51. While this was considerably lower than that obtained in the assessment of spacial syntax it should be recognized that the qualities being assessed are considerably more subtle and complex.

Analyses of the drawings with respect to differences in aesthetic performance between socio-economic group and sex indicated that no significant differences between S.E.S. were found and that although differences between the sexes approached significance in favor of the males, the most striking characteristic of the aesthetic qualities of the drawings assessed both formally and informally was the similarity in level of aesthetic performance.

Because the major analyses of the data were performed on populations of unequal size a random selection from each of the two socio-economic groups was made. Scores from this population consisting of 62 subjects in each socio-economic group at each grade were then analyzed with respect to questions raised of the entire population. This was done to determine if the findings for the larger group were affected by cells of unequal size. These analyses indicated no major differences between the findings of these two populations.

Contrary to the expectations in which this study was grounded culturally disadvantaged children were at no advantage in drawing compared to children living in more affluent settings. The performance patterns of both populations suggest two things. First, the type of cognitive-linguistic deprivation that is characteristic of the slum environment appears to affect drawing technologies as it affects discursive - symbolic activity. This tends to provide additional support to Goodenough and Harris' claim that drawing is a useful index of concept formation. Second, the fact that the disadvantaged group catches up to whose who are advantaged and because the average level of performance in drawing at the seventh grade is not impressive from a technical standpoint suggests that instruction in art with respect to the treatment of space is either absent or ineffective. The former appears to me to be a more accurate description of the state of affairs than the latter since few schools provide art teachers at the elementary school levels and even in the few cases when such teachers are available instruction in drawing is seldom emphasized.

Finally, a variety of problems were raised by the study that appear to warrant further inquiry. Some of these problems deal with stability of drawing technologies over time and under the influence of different stimuli, the extent to which rate of learning in the use of drawing technologies can be increased, and the development of scales useful for plotting development in other aspects of the visual arts such as color, proportion, and texture.

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Table I

POPULATION CHARACTERISTICS

GRADE	1	3	5	7	Total
N	325	344	259	165	1093
MALES	175	169	137	89	570
FEMALES	150	175	122	76	523
WHITES	88	102	86	137	413
NEGROES	237	235	158	25	655
OTHER	0	7	15	3	25
UPPER CLASS WHITES *	54	72	68	92	286
LOWER CLASS WHITES	34	30	18	45	127
UPPER CLASS NEGROES	33	29	30	5	97
LOWER CLASS NEGROES	204	206	128	20	558
UPPER CLASS OTHER	0	3	3	0	6
LOWER CLASS OTHER	0	4	12	3	19
UPPER CLASS	87	104	101	97	389
LOWER CLASS	238	240	158	68	704

* Upper class refers to subjects in the upper half of the S.E.S. distribution.

Lower class refers to those in the lower half of the distribution.

Table II

PER CENT OF AGREEMENT BETWEEN JUDGES

THE DRAWING SCORES ASSIGNED INDEPENDENTLY BY EACH JUDGE DIFFERED BY . . .

0 IN 801 CASES OR 71.65 PERCENT OF THE TOTAL SAMPLE
1 IN 88 CASES OR 7.87 PERCENT OF THE TOTAL SAMPLE
2 IN 58 CASES OR 5.19 PERCENT OF THE TOTAL SAMPLE
3 IN 33 CASES OR 2.95 PERCENT OF THE TOTAL SAMPLE
4 IN 31 CASES OR 2.77 PERCENT OF THE TOTAL SAMPLE
5 IN 30 CASES OR 2.68 PERCENT OF THE TOTAL SAMPLE
6 IN 13 CASES OR 1.16 PERCENT OF THE TOTAL SAMPLE
7 IN 7 CASES OR .63 PERCENT OF THE TOTAL SAMPLE
8 IN 16 CASES OR 1.43 PERCENT OF THE TOTAL SAMPLE
9 IN 10 CASES OR .89 PERCENT OF THE TOTAL SAMPLE
10 IN 8 CASES OR .72 PERCENT OF THE TOTAL SAMPLE
11 IN 18 CASES OR 1.61 PERCENT OF THE TOTAL SAMPLE
12 IN 2 CASES OR .18 PERCENT OF THE TOTAL SAMPLE
13 IN 2 CASES OR .18 PERCENT OF THE TOTAL SAMPLE

IN 1109 CASES OR 99.19 PERCENT OF THE TOTAL SAMPLE THE JUDGES AGREED JOINTLY.

Table III

COEFFICIENTS OF CORRELATION AMONG JUDGES

	JUDGE 1	JUDGE 2	JOINT JUDGMENT
JUDGE 1	1.00		
JUDGE 2	.802	1.00	
JOINT JUDGMENT	.910	.873	1.00

Table IV

PERCENTAGE OF DRAWINGS ASSIGNED TO EACH CATEGORY
BY GRADE AND CATEGORY

CATEGORY	GRADE 1	GRADE 3	GRADE 5	GRADE 7	ROW PCT.
1	21.23	.87	.77	.0	6.77
2	4.31	18.02	5.02	1.21	8.33
3	18.46	18.02	7.72	1.21	13.17
4	2.77	5.52	.77	.0	2.74
5	3.08	2.03	3.47	.61	2.47
6	.31	.29	1.54	.61	.64
7	4.31	1.45	1.54	1.21	2.29
8	13.54	23.84	9.65	9.09	15.19
9	12.92	6.40	7.72	1.82	7.96
10	.31	1.16	1.16	.0	.73
11	2.46	6.98	20.08	37.58	13.36
12	3.38	4.65	10.42	6.67	5.95
13	7.08	9.01	23.94	32.12	15.46
14	5.85	1.74	6.18	7.88	4.94
COLUMN TOTAL N	325	344	259	165	1093

Table V

MEANS AND STANDARD DEVIATIONS OF DRAWING SCORES BY GRADE FOR TOTAL POPULATION

GRADE	1	3	5	7
N	325	344	259	165
M	6.12	6.69	9.76	11.31
SD	4.32	3.90	3.65	2.28

DF = 1092   F = 101.23 *

* Significant at the .01 level of probability

Table VI

MEANS AND STANDARD DEVIATIONS OF DRAWING SCORES BY GRADE FOR MALES

GRADE	1	3	5	7
N	175	169	137	89
M	6.17	6.84	9.48	11.22
SD	4.49	4.07	3.85	2.26

DF = 569 F = 43.83 *

* Significant at the .01 level of probability

Table VII

MEANS AND STANDARD DEVIATIONS OF DRAWING SCORES BY GRADE FOR FEMALES

GRADE	1	3	5	7
N	150	175	122	76
M	6.08	6.54	10.07	11.42
SD	4.13	3.72	3.41	2.31

DF = 522 F = 59.72 *

* Significant at the .01 level of probability

Table VIII

CUMULATIVE COLUMN PERCENTAGES OF DRAWINGS ASSIGNED TO CATEGORIES BY GRADE

CATEGORY	GRADE 1	GRADE 3	GRADE 5	GRADE 7
1	21.23	.87	.77	0
2	25.54	18.89	5.79	1.21
3	44.00	36.91	13.51	2.42
4	46.77	42.43	14.28	2.42
5	49.85	44.46	17.75	3.03
6	50.16	44.75	19.29	3.64
7	54.47	46.20	20.83	4.85
8	68.01	70.04	30.48	13.94
9	80.93	76.44	38.20	15.76
10	81.24	77.60	39.36	15.76
11	83.70	84.58	59.44	53.34
12	87.08	89.23	69.86	60.01
13	94.16	98.24	93.80	92.13
14	100.01	99.98	99.98	100.01

Table IX

MEANS AND STANDARD DEVIATIONS OF DRAWING SCORES BY SEX AND GRADE

	MALES		FEMALES			
GRADE	M.	S.D.	M.	S.D.	t	D.F.
1	6.17	4.48	6.08	4.12	.19	323
3	6.85	4.07	6.54	3.72	.72	342
5	9.49	3.84	10.07	3.40	1.29	257
7	11.23	2.25	11.42	2.30	.55	163

Table X

MEANS AND STANDARD DEVIATIONS OF DRAWING SCORES FOR SUBJECTS SPLIT BY SOCIO-ECONOMIC-STATUS FOR TOTAL POPULATION

	S.E.S. Lower Half	S.E.S. Upper Half	t	DF
Drawing Score	6.99	9.65	10.30 *	1091
	S.D.	S.D.		
	4.27	3.70		

* Significant at the .01 level of probability

Table XI

MEANS AND STANDARD DEVIATIONS OF DRAWING SCORES BY GRADE AND SOCIO-ECONOMIC-STATUS

	LOWER S.E.S.		UPPER S.E.S.			
GRADE	M.	S.D.	M.	S.D.	t	D.F.
1	5.56	4.23	7.69	4.16	4.03 *	323
3	6.04	3.71	8.20	3.89	4.88 *	342
5	8.93	3.94	11.07	2.65	4.78 *	257
7	10.70	2.98	11.66	1.85	2.52 *	163

* Significant at the .01 level of probability

Table XII

MEANS AND STANDARD DEVIATIONS OF DRAWING SCORES FOR FEMALES BY GRADE AND SOCIO-ECONOMIC-STATUS

FEMALES - LOWER S.E.S.

GRADE	1	3	5	7
N	111	129	85	34
M	5.79	6.00	9.67	10.79
SD	4.17	3.49	3.59	2.91

DF = 358 F = 33.24 *

* Significant at the .01 level of probability

FEMALES - UPPER S.E.S.

GRADE	1	3	5	7
N	39	46	37	42
M	6.89	8.06	11.00	11.92
SD	3.93	3.96	2.78	1.53

DF = 163 F = 21.99 *

* Significant at the .01 level of probability

Table XIII

MEANS AND STANDARD DEVIATIONS
OF DRAWING SCORES FOR MALES
BY GRADE AND SOCIO-ECONOMIC-STATUS

MALES - LOWER S.E.S.

GRADE	1	3	5	7
N	127	111	73	34
M	5.35	6.08	8.06	11.00
SD	4.29	3.97	4.20	2.52

DF = 344 F = 21.26 *

* Significant at the .01 level of probability

MALES - UPPER S.E.S.

GRADE	1	3	5	7
N	48	58	64	55
M	8.33	8.31	11.10	11.36
SD	4.31	3.88	2.61	2.10

DF = 224 F = 14.54 *

* Significant at the .01 level of probability

Table XIV

MEANS AND STANDARD DEVIATIONS OF GRADE, SOCIO-ECONOMIC-STATUS AND DRAWING SCORE FOR TOTAL POPULATION

	N	M	SD
GRADE	1093	2.24	1.04
SOCIAL CLASS	1093	4.74	3.12
DRAWING SCORE	1093	7.95	4.27

Table XV

COEFFICIENTS OF CORRELATION BETWEEN DRAWING SCORES, SOCIO-ECONOMIC-STATUS AND GRADE

	Grade	Social Class	Drawing Score
GRADE	1.00		
SOCIAL CLASS	.25 *	1.00	
DRAWING SCORE	.45 *	.36 *	1.00

N = 1093

* Significant at the .01 level of probability

Table XVI

COEFFICIENT OF CORRELATION BETWEEN DRAWING SCORES AND READING SCORES FOR GRADES FIVE and SEVEN COMBINED

R = .44 * N = 421

* Significant at the .01 level of probability

Table XVII

MEANS AND STANDARD DEVIATIONS FOR DRAWING SCORES AND READING VOCABULARY SCORES FOR GRADES FIVE and SEVEN COMBINED

	M	N	S.D.
Drawing Score	10.38	421	3.27
Reading Vocabulary Score	6.67	421	2.56

Table XVIII

COEFFICIENTS OF CORRELATION BETWEEN READING VOCABULARY SCORES AND DRAWING SCORES AT GRADE FIVE and AT GRADE SEVEN

Grade 5	R = .47 *	N = 256
Grade 7	R = .18 *	N = 165

* Significant at the .01 level of probability

Table XIX

MEAN DRAWING SCORES FOR FIFTH GRADE SUBJECTS IN THE UPPER AND LOWER HALVES ON READING VOCABULARY SCORES

	LOWER HALF		UPPER HALF			
	M.	S.D.	M.	S.D.	t	D.F.
Drawing Score	8.50	3.88	11.06	2.86	5.98 *	254

* Significant at the .01 level of probability

Table XX

MEAN DRAWING SCORES FOR SEVENTH GRADE SUBJECTS IN THE UPPER AND LOWER HALVES ON READING VOCABULARY SCORES

	LOWER HALF		UPPER HALF			
	M	S.D.	M	S.D.	t	D.F.
Drawing Score	10.96	2.54	11.67	1.89	2.00 **	163

** Significant at the .05 level of probability

Table XXI

COEFFICIENTS OF CORRELATION BETWEEN DRAWING SCORES AND IQ FOR SAMPLE AND BY GRADE

Sample	.34 *	N = 759
Grade 1	.35 *	N = 202
Grade 3	.42 *	N = 214
Grade 5	.40 *	N = 232
Grade 7	.33 *	N = 111

* Significant at the .01 level of probability

Table XXII

COEFFICIENTS OF CORRELATION
BETWEEN JUDGES 1 AND 2
FOR EACH CATEGORY AND FOR ALL CATEGORIES

Category	R	N
1	.52 *	73
2	.55 *	90
3	.55 *	145
4	.67 *	31
5	.31 *	28
6	.55 *	9
7	.53 *	24
8	.45 *	169
9	.56 *	88
10	.73 *	6
11	.51 *	147
12	.49 *	63
13	.38 *	168
14	.59 *	52
TOTAL	.51 *	1093

* Significant at the .01 level of probability

Table XXIII

MEANS AND STANDARD DEVIATIONS OF JUDGE 1 AND JUDGE 2 ON JUDGMENTS OF THE AESTHETIC QUALITY OF 1093 DRAWINGS

	M	SD	N
Judge 1	3.54	1.09	1093
Judge 2	3.65	1.12	

Table XXIV

MEANS AND STANDARD DEVIATIONS OF JUDGES 1 AND 2 ON JUDGMENTS OF THE AESTHETIC QUALITY OF DRAWINGS BY CATEGORY

Category	Judge	M	SD	N
1	1	3.55	1.17	73
	2	3.79	1.43	
2	1	3.14	1.18	90
	2	3.24	1.34	
3	1	3.61	1.08	145
	2	3.60	1.26	
4	1	3.16	1.10	31
	2	3.32	1.25	
5	1	3.21	.92	28
	2	3.50	.79	
6	1	2.56	1.13	9
	2	2.78	.83	
7	1	3.08	1.41	24
	2	3.46	1.28	
8	1	4.00	.83	169
	2	3.80	.95	
9	1	3.55	1.00	88
	2	3.98	.88	
10	1	3.00	1.41	6
	2	3.17	1.17	
11	1	3.64	1.20	147
	2	3.61	.94	
12	1	3.24	1.07	63
	2	3.32	1.18	
13	1	3.53	.98	168
	2	3.65	1.09	
14	1	3.58	1.19	52
	2	4.33	.83	

Table XXV

t TEST OF MEANS FOR AESTHETIC QUALITY
FOR TOTAL GROUP
BY SOCIO-ECONOMIC-STATUS

Lower S.E.S.			Upper S.E.S.		
N	M	Var	N	M	Var
689	7.14	3.93	377	7.34	3.32

t = 1.62

Table XXVI

t TEST OF MEANS
BY SOCIO-ECONOMIC-STATUS
AND BY CATEGORY

	Lower S.E.S.			Upper S.E.S.			
CATEGORY	N	M	V	N	M	V	t
1	62	7.27	5.12	8	7.50	6.57	.27
2	67	6.72	4.63	17	5.82	5.15	1.52
3	116	7.22	4.37	27	7.19	4.00	.07
4	19	6.58	5.15	11	7.45	4.27	1.04
5	19	6.63	1.47	6	6.83	4.57	.29
6	6	5.50	3.10	3	5.00	4.00	.38
7	20	6.55	5.00	4	6.50	11.00	.03
8	110	7.86	2.16	55	7.73	2.63	.51
9	67	7.46	2.43	19	7.58	4.26	.27
10	5	6.40	6.80	1	5.00	0	.49
11	55	6.84	4.66	88	7.52	2.57	2.15 **
12	34	6.44	5.77	28	6.68	1.56	.47
13	84	6.99	3.12	83	7.40	2.78	1.54
14	25	7.48	3.68	27	8.30	2.75	1.65

** Significant at the .05 level of probability

Table XXVII

t TEST OF MEANS FOR AESTHETIC QUALITY FOR TOTAL GROUP BY SEX

Males			Females		
N	M	Var	N	M	Var
546	7.43	3.56	532	6.99	3.76

t = 3.78 *

* Significant at the .01 level of probability

Table XXVIII

t TEST OF MEANS ON AESTHETIC QUALITY BY SEX AND SOCIO-ECONOMIC-STATUS

Males

Lower S.E.S.			Upper S.E.S.			
N	M	Var.	N	M	Var.	t
333	7.36	3.80	209	7.54	3.17	1.08

Females

Lower S.E.S.			Upper S.E.S.			
N	M	Var.	N	M	Var.	t
352	6.94	4.01	172	7.10	3.36	.88

Table XXIX

MEAN DRAWING SCORES BY GRADE FOR A RANDOMLY SELECTED SAMPLE

		M	SD	N
Drawing Score Mean in Total Group		7.99	4.12	496
Grade	1	5.35	3.79	124
	3	6.68	3.94	124
	5	8.91	3.77	124
	7	11.00	2.32	124

Table XXX

MEAN DRAWING SCORES BY GRADE FOR SUBJECTS IN UPPER AND LOWER HALVES OF THE POPULATION BY SOCIO-ECONOMIC-STATUS

RANDOMLY SELECTED SAMPLE

	LOWER S.E.S.		UPPER S.E.S.			
GRADE	M	SD	M	S.D.	t	DF
1	3.80	3.07	6.90	3.77	4.96 *	122
3	4.74	3.02	8.62	3.76	6.28 *	122
5	7.40	3.97	10.43	2.81	4.86 *	122
7	10.59	2.62	11.41	1.86	1.99 **	122

* Significant at the .01 level of probability

** Significant at the .05 level of probability

Table XXXI

MEAN DRAWING SCORES
BY GRADE, SEX and SOCIO-ECONOMIC-STATUS
FOR RANDOMLY SELECTED SAMPLE

Lower Half - S.E.S.

	Males		Females			
Grade	M	SD	M	SD	t	DF
1	3.75	2.98	3.88	3.26	.16	60
3	4.29	3.20	5.08	2.83	1.01	60
5	6.14	3.95	8.37	3.71	2.23 **	60
7	10.71	2.41	10.48	2.81	.33	60

Upper Half - S.E.S.

	Males		Females			
Grade	M	SD	M	SD	t	DF
1	7.21	3.89	6.55	3.60	.67	60
3	8.51	3.89	8.80	3.55	.28	60
5	10.40	2.68	10.48	2.99	.10	60
7	11.00	2.20	11.89	1.21	1.91	60

** Significant at the .05 level of probability

Table XXXII

COEFFICIENTS OF CORRELATION BETWEEN DRAWING SCORES AND READING VOCABULARY SCORES FOR A RANDOMLY SELECTED SAMPLE

Grade 5	R = .53 *	N = 124
Grade 7	R = .26 *	N = 124
Grades 5 & 7	R = .52 *	N = 248

* Significant at the .01 level of probability

Table XXXIII

MEAN DRAWING AND READING VOCABULARY SCORES FOR SUBJECTS IN GRADES FIVE, SEVEN, AND FIVE and SEVEN COMBINED

RANDOMLY SELECTED SAMPLE

	M	SD	N
Grade 5			124
Drawing Score	8.91	3.78	
Reading Score	5.26	2.46	
Grade 7			124
Drawing Score	11.00	2.32	
Reading Score	8.42	2.07	
Grades 5 and 7			248
Drawing Score	9.96	3.30	
Reading Score	6.84	2.77	

Table XXXIV

COEFFICIENT OF CORRELATION BETWEEN DRAWING SCORES AND IQ FOR RANDOMLY SELECTED SAMPLE

R = .349 *

N = 455

# Forty one subjects in this population did not have IQ scores available, hence the smaller population.

* Significant at the .01 level of probability

Table XXXV

MEDIAN DRAWING SCORE - TOTAL POPULATION

Drawing Score	N	Cumulative Totals
1	81	81
2	96	177
3	160	337
4	30	367
5	23	390
6	14	404
7	27	431
8	165	596
9	98	694
10	7	701
11	142	843
12	60	903
13	166	1069
14	48	1117
TOTAL	1117	

MEDIAN = 8.77

Table XXXVI

MEANS AND STANDARD DEVIATIONS FOR IQ AND DRAWING SCORES BY GRADE

	VARIABLE	M	N	SD
Population	IQ	99.44	759	15.47
	Drawing Score	7.77	759	4.38
Grade 1	IQ	103.25	202	13.05
	Drawing Score	5.29	202	4.27
Grade 3	IQ	94.24	214	16.06
	Drawing Score	6.22	214	3.93
Grade 5	IQ	97.30	232	14.27
	Drawing Score	9.67	232	3.67
Grade 7	IQ	106.98	111	16.30
	Drawing Score	11.31	111	2.24

Table XXXVII

t TEST OF MEANS FOR AESTHETIC QUALITY BY SEX AND BY CATEGORY

	Males			Females			
Category	N	M	V	N	M	V	t
1	44	7.27	4.81	26	7.35	6.08	-0.14
2	43	7.16	4.66	41	5.88	4.21	2.78 *
3	64	7.25	4.25	80	7.20	4.29	0.14
4	14	6.71	3.60	17	6.29	5.60	0.54
5	15	6.60	2.26	13	6.85	1.64	-0.47
6	6	6.00	3.20	3	4.00	0	1.87
7	12	6.50	7.00	12	6.58	4.63	-0.08
8	74	8.07	2.15	95	7.60	2.37	2.01 *
9	35	8.00	1.71	52	7.17	3.28	2.33 *
10	5	6.80	4.20	1	3.00	0	1.69
11	89	7.49	3.62	55	6.93	3.14	1.76 **
12	31	7.06	4.33	31	6.03	2.90	2.13 *
13	86	7.48	2.61	82	6.88	3.19	2.29 **
14	28	7.75	3.68	24	8.08	2.95	-0.65

* Significant at the .01 level of probability

** Significant at the .05 level of probability

Figure 2

Drawing Score Means by Grade -- Total Population

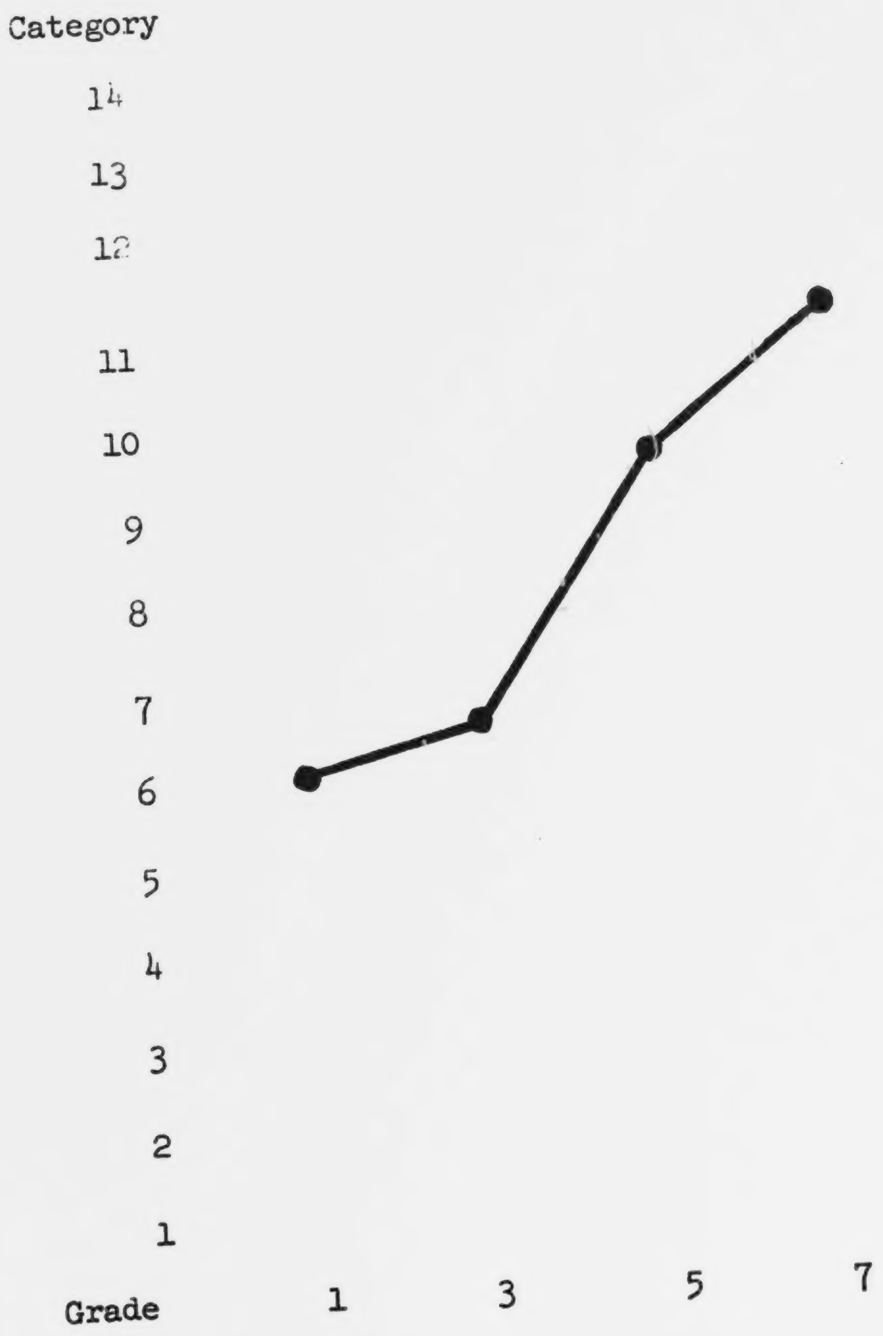


Figure 3

Drawing Score Means by Grade -- Sample

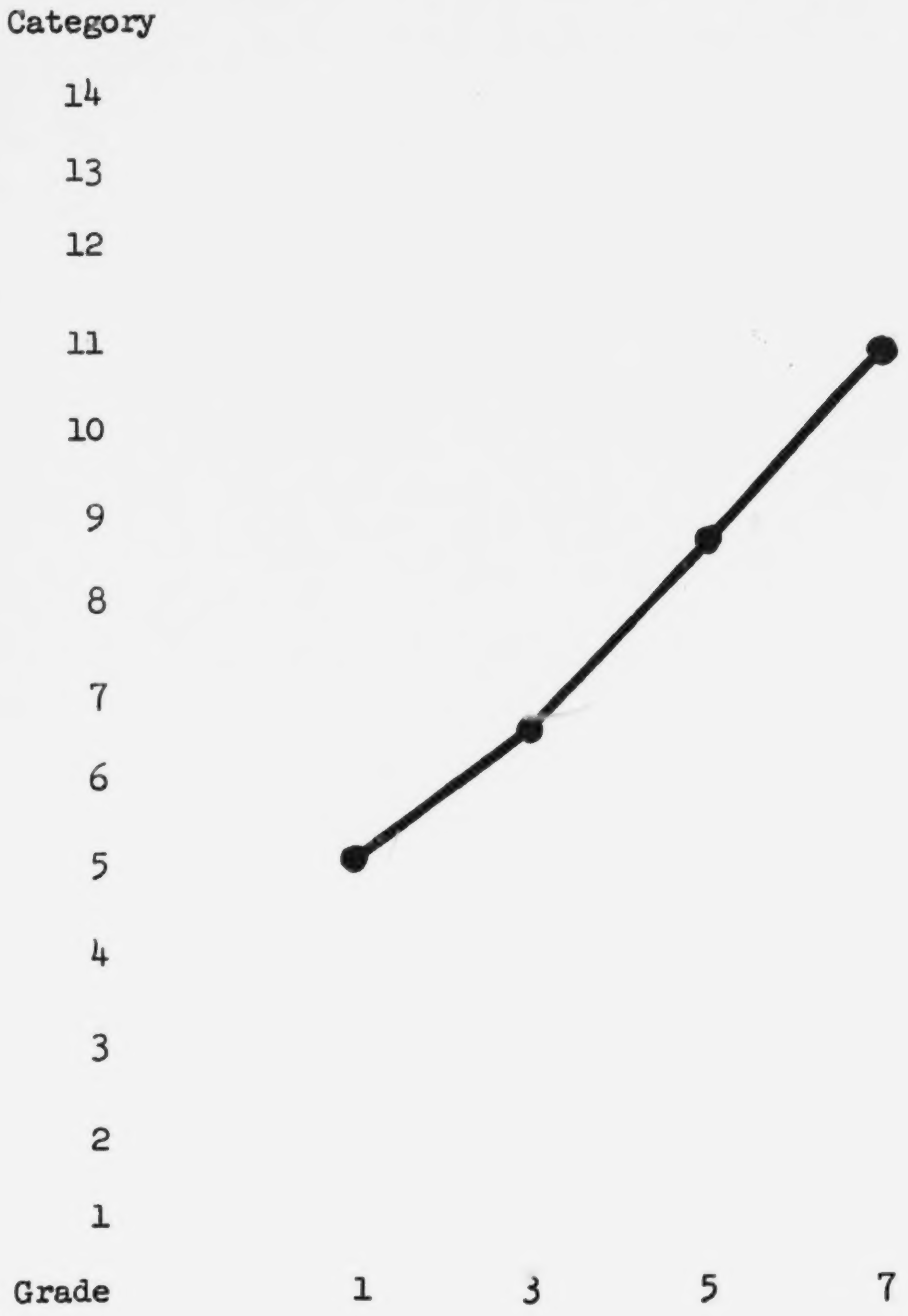


Figure 4

Drawing Score Means by Sex and Grade

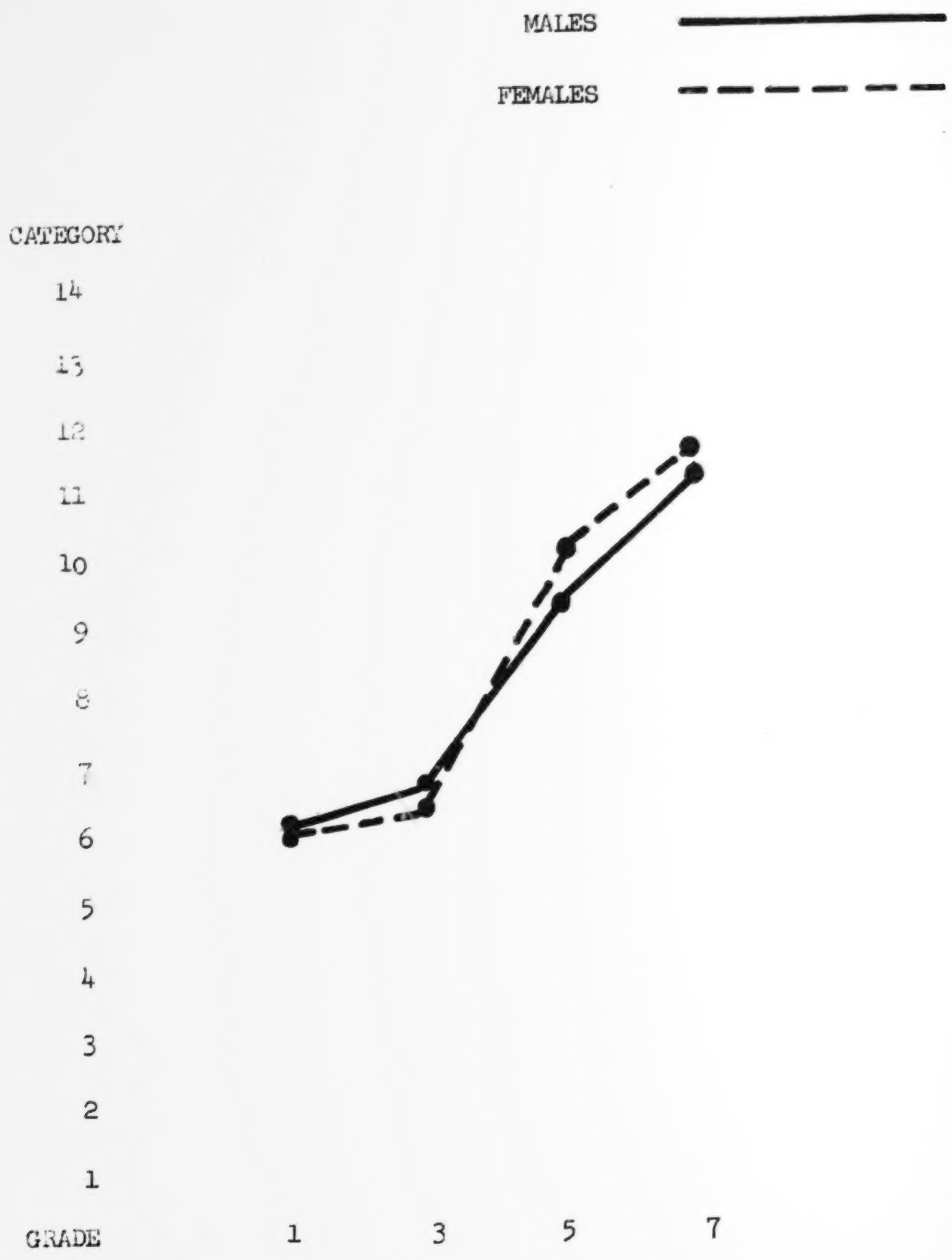


Figure 5

PERCENTAGE OF DRAWINGS ASSIGNED TO EACH CATEGORY

Grade One

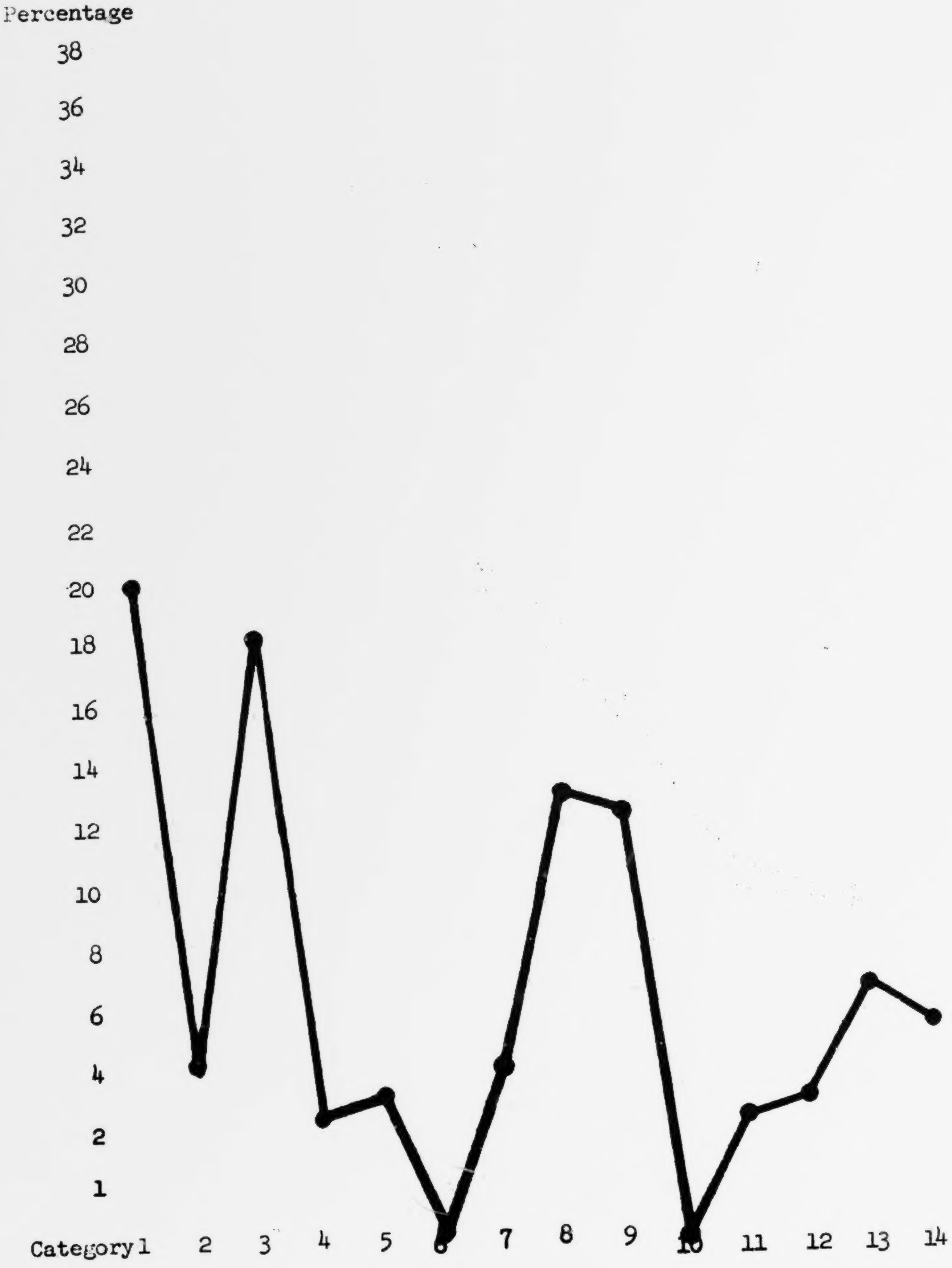


Figure 6

PERCENTAGE OF DRAWINGS ASSIGNED TO EACH CATEGORY

Grade Three

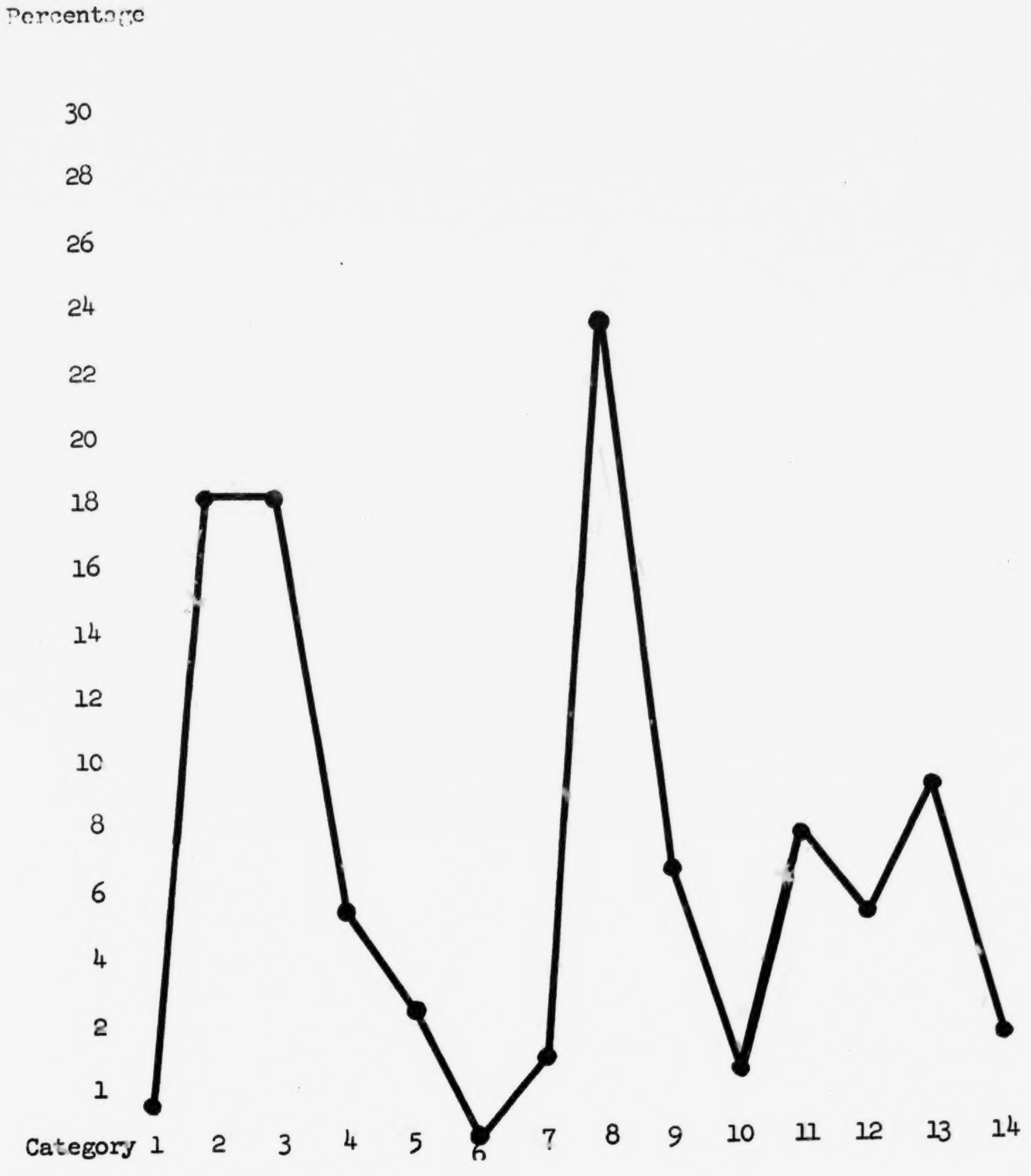


Figure 7

PERCENTAGE OF DRAWINGS ASSIGNED TO EACH CATEGORY

Grade Five

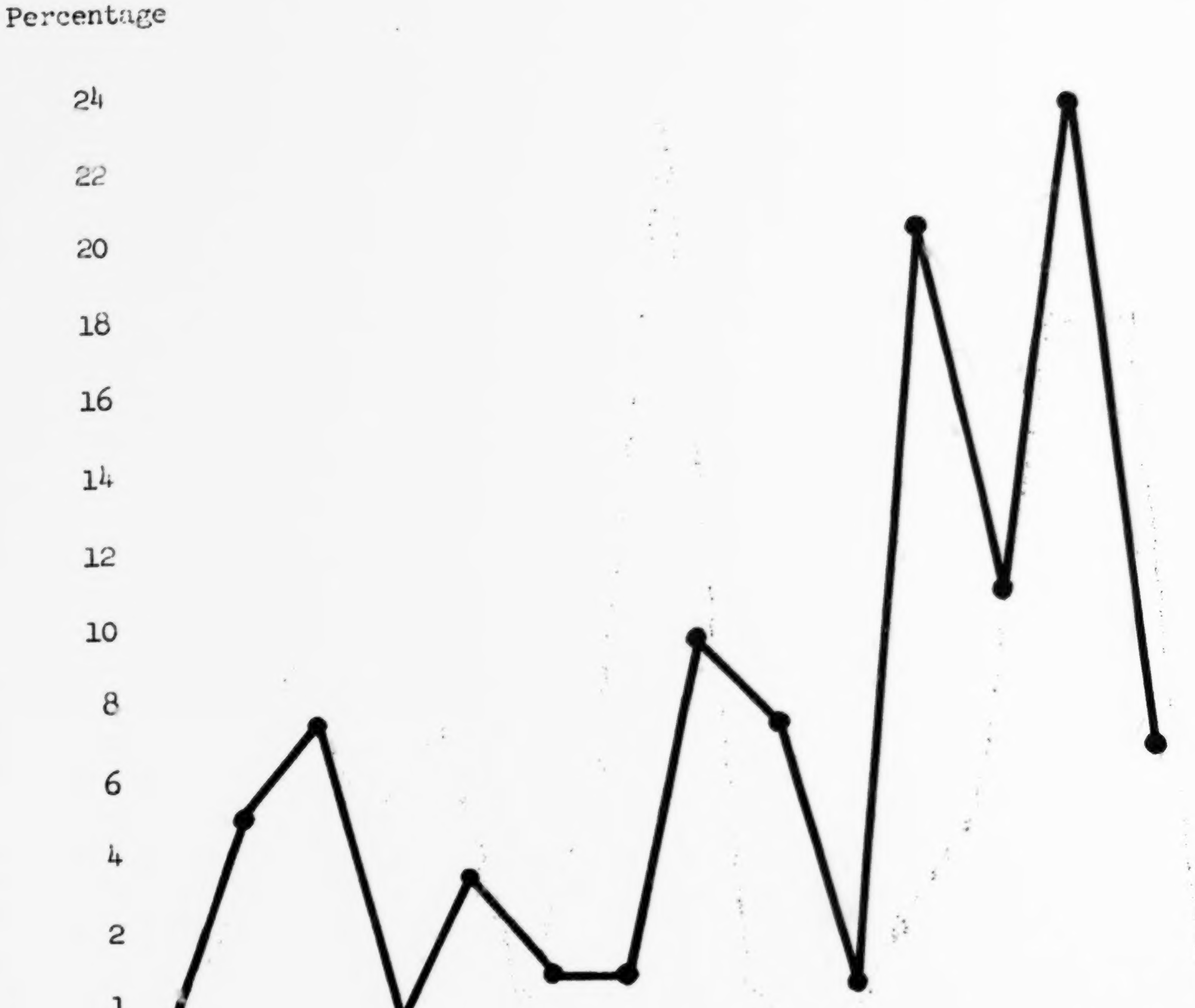


Figure 8

PERCENTAGE OF DRAWINGS ASSIGNED TO EACH CATEGORY

Grade Seven

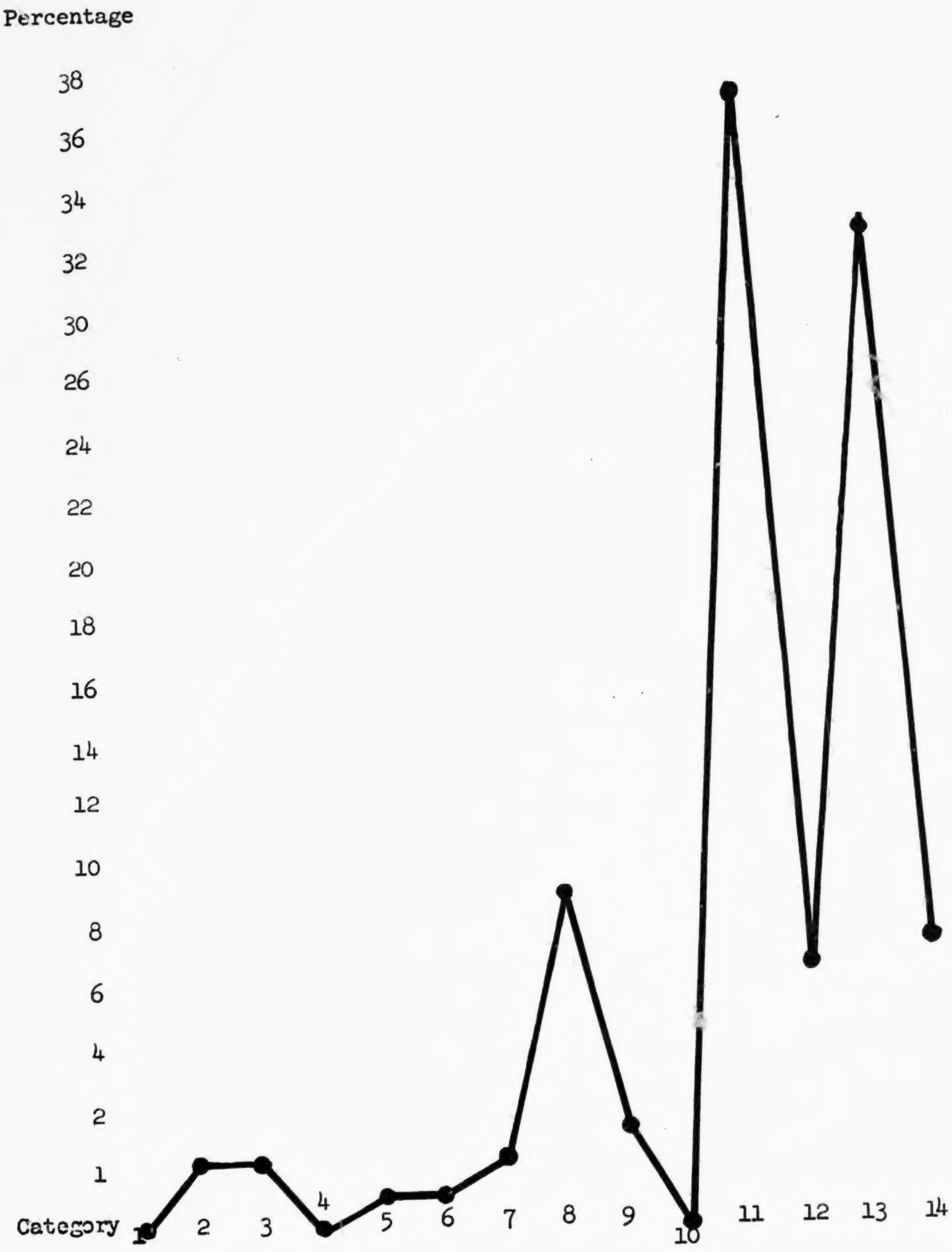


Figure 9

DRAWING SCORE MEANS BY GRADE AND S.E.S.

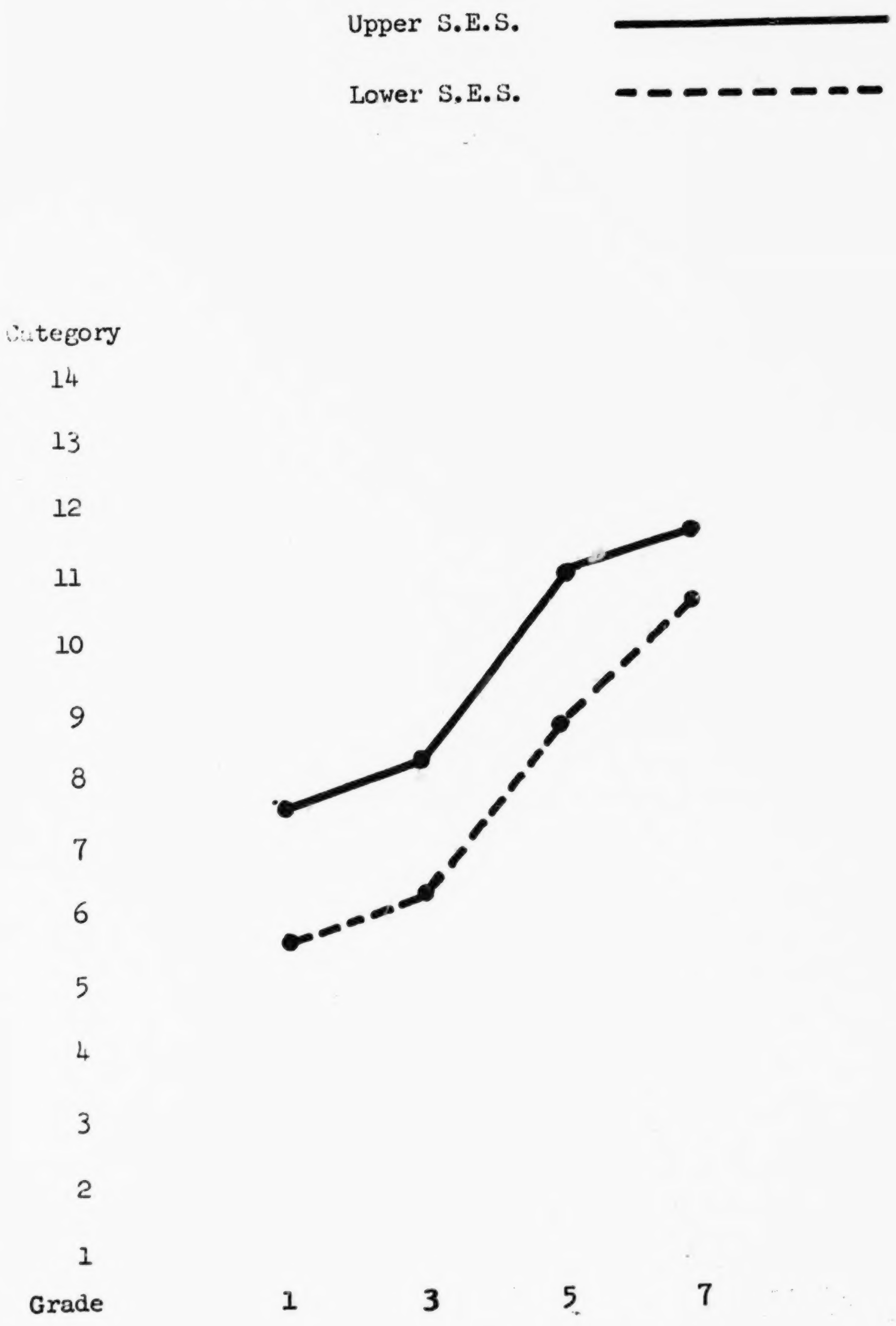


Figure 10

DRAWING SCORE MEANS BY GRADE AND S.E.S.

Females

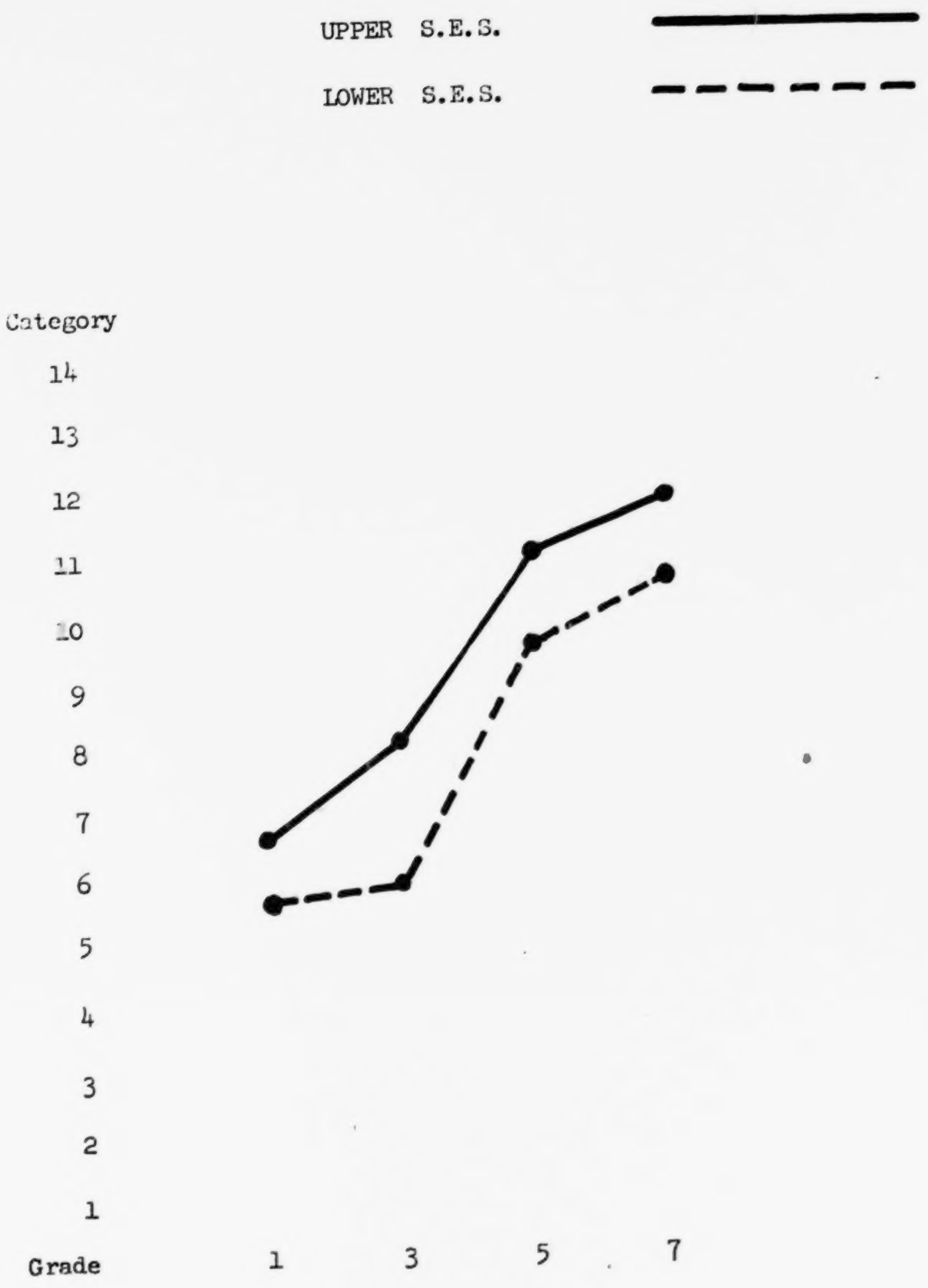
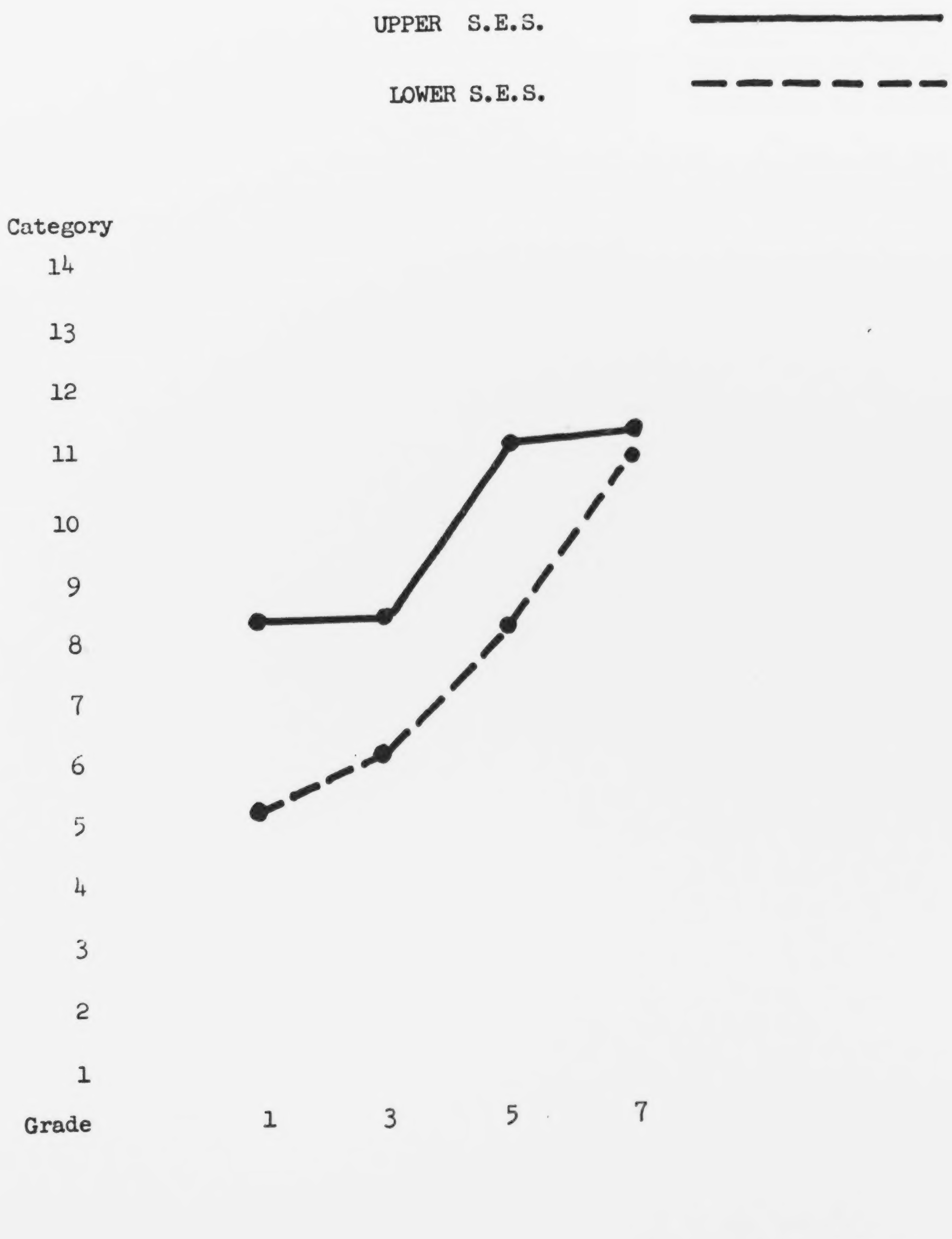


Figure 11

DRAWING SCORE MEANS BY GRADE AND S.E.S.

Males



Visual Examples of Each Category

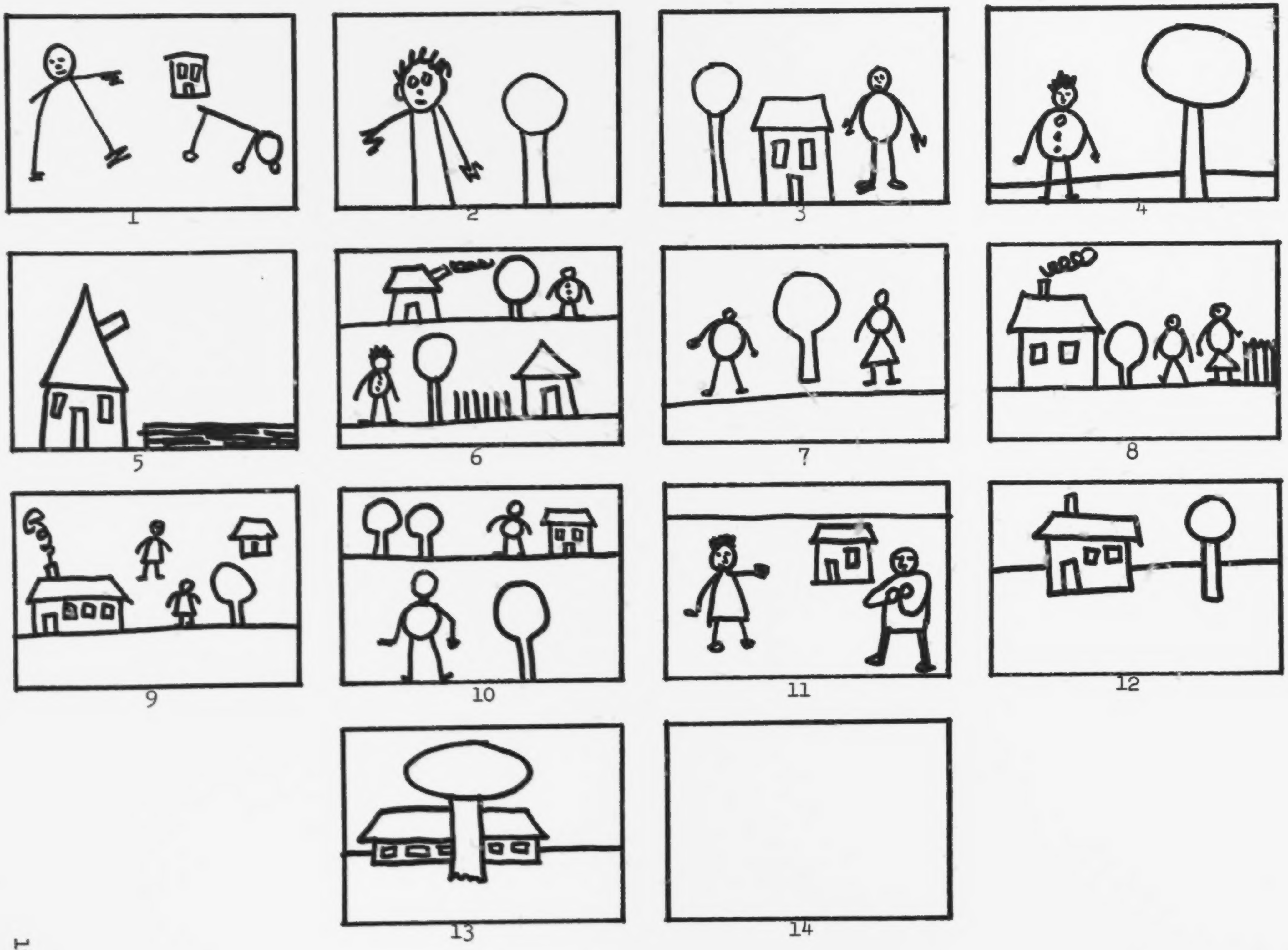

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Figure 12